410096

# FLOOD INSURANCE STUDY

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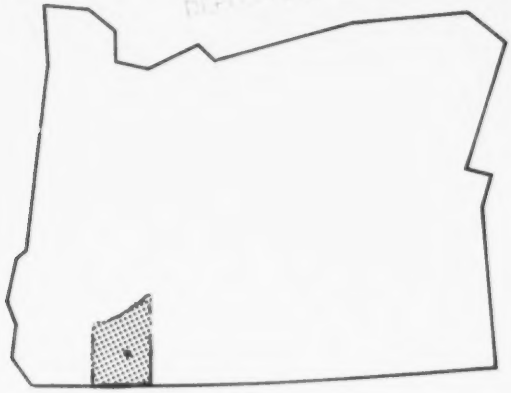
## CITY OF MEDFORD, OREGON
JACKSON COUNTY



OCTOBER 15, 1980

federal emergency management agency
federal insurance administration

COMMUNITY NUMBER - 410096

FEMI.209:

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Flood Boundary and Floodway Map

PUBLISHED SEPARATELY:

Flood Insurance Rate Map Index
Flood Insurance Rate Map

# FLOOD INSURANCE STUDY

## 1.0 INTRODUCTION

### 1.1 Purpose of Study

The purpose of this Flood Insurance Study is to investigate the existence and severity of flood hazards in the City of Medford, Jackson County, Oregon, and to aid in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. Initial use of this information will be to convert Medford to the regular program of flood insurance by the Federal Insurance Administration. Further use of the information will be made by local and regional planners in their efforts to promote sound land use and flood plain development.

### 1.2 Coordination

In April 1976, areas to be studied were identified at a meeting attended by representatives of the Federal Insurance Administration, the City of Medford, and STRAAM Engineers, Inc. (the study contractor). Final determination by the Federal Insurance Administration incorporated any suggestions from the Jackson County Department of Planning and Development and the Oregon Water Resources Board.

The U.S. Geological Survey, the Oregon State Highway Department, the Medford City Engineers Office, the Jackson County surveyor, and the Jackson County Department of Planning and Development were all contacted for information used in this study.

The results of this study were reviewed at a final community coordination meeting held on April 10, 1979. Attending the meeting were representatives of the Federal Insurance Administration, the study contractor, and the city. This study incorporates all appropriate comments, and all problems have been resolved.

### 1.3 Authority and Acknowledgments

The source of authority for this Flood Insurance Study is the National Flood Insurance Act of 1968, as amended.

The hydrologic and hydraulic analyses for this study were performed by STRAAM Engineers, Inc., for the Federal Insurance Administration, under Contract No. H-3995. This work, which was completed in July 1978, covered all significant flooding sources affecting the City of Medford.

## 2.0 AREA STUDIED

### 2.1 Scope of Study

This Flood Insurance Study covers the incorporated area of the City of Medford, Jackson County, Oregon. The area of study is shown on the Vicinity Map (Figure 1).

Unincorporated portions of Jackson County are excluded from this study.

Bear Creek and its tributaries, which include Lazy, Larson, Unnamed Tributary to Larson, Crooked, and segments of Lone Pine Creeks, were all studied in detail within the corporate limits.

The limits of detailed study in Medford were determined by the Federal Insurance Administration after consultation with the community and the study contractor.

Those areas studied by detailed methods were chosen with consideration given to all proposed construction and forecasted development through 1983.

Those areas studied by approximate methods included the Unnamed Tributary to Larson Creek and the area above Crater Lake Highway on Lone Pine Creek. These areas were studied by approximate methods due to lack of development. These areas were also determined by the Federal Insurance Administration after consultation with the community and the study contractor.

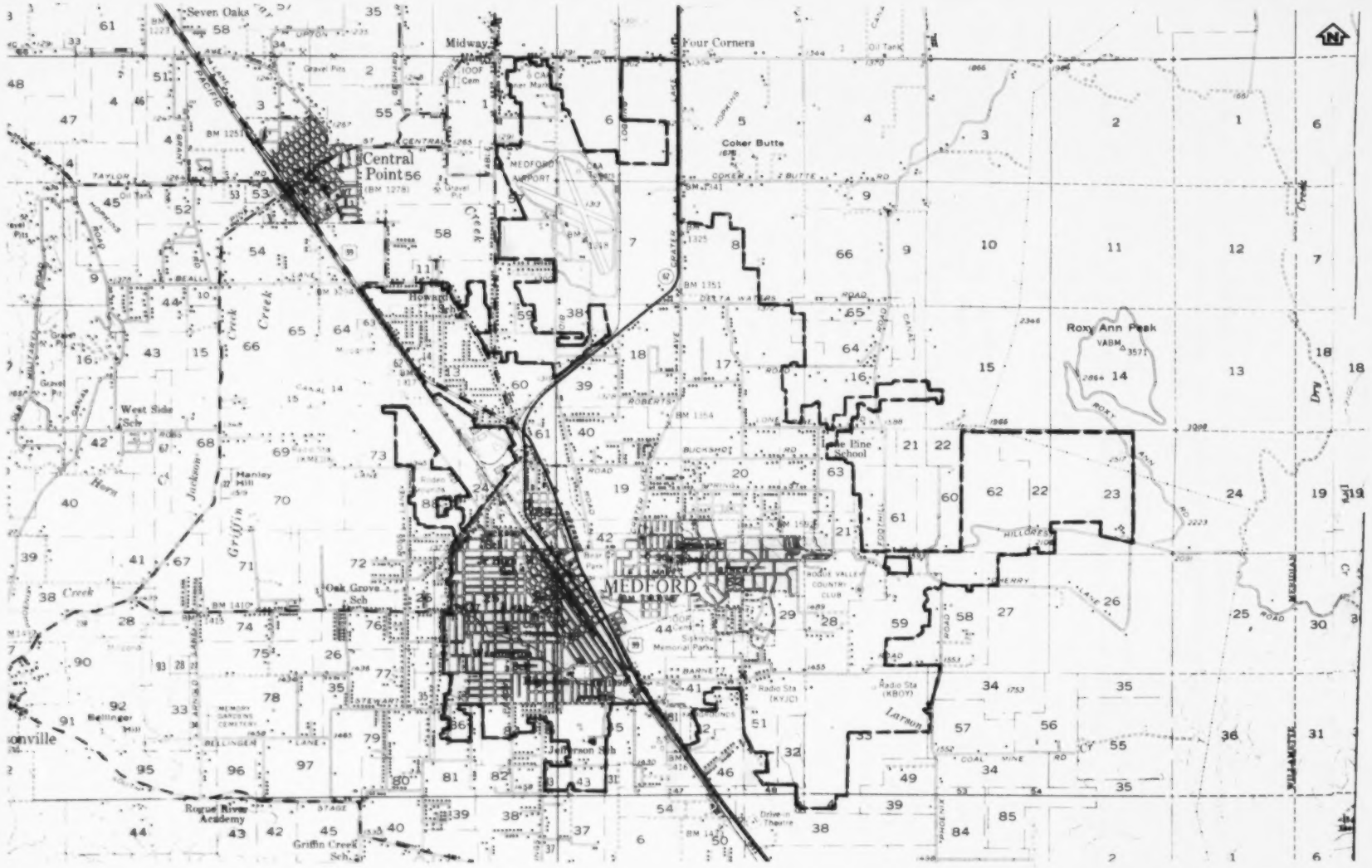
### 2.2 Community Description

The City of Medford, the county seat, is located in central Jackson County, in southwestern Oregon.

The city is the commercial center for southern Oregon and parts of northern California. The lumber industry is the largest employer in the area, with agriculture being second in terms of employment. Medford has an interstate airport and numerous medical facilities. In addition to being an important commercial center, Medford is also a popular retirement area because of its moderate climate.

The average temperature in Medford is 51.9°F, and the annual precipitation is 20.7 inches. The population of Medford in 1976 was 34,900, an increase of 5,616 over the 1970 census population of 29,284 (Reference 1).

Medford lies at the lower end of a valley drained by Bear Creek. It is east of the Coast Range of mountains, but west of the Cascade Mountains. The city is fairly flat, except for some hills on the


Seven Oaks
Midway
Four Corners
Central Point
Coker Butte
Roxy Ann Peak
West Side Sch
Manley Hill
Howard
Oak Grove Sch
MEDFORD
Jefferson Sch
Rogue River Academy
Griffin Creek Sch
Bellinger Hill
Jackson Creek
Griffin Creek
Horn Creek
Larson
Bear Creek
Pine School
Radio Sta (KBOY)
Radio Sta (KYJC)
Drive-In Theatre
Rogue Valley Country Club
Memorial Park
Medford Airport
Gravel Pits
Cem
Oil Tank
Water Tank
Pacific Highway
Foothill Road
Hillcrest Road
Coal Mine Road
Buckshot Road
Roberts Road
Taylor Road
Canal
Ditch
Creek
Lane
Road
Drive
Avenue
Street
Boulevard
Place
Court
Terrace
Circle
Trail
Highway
Interstate
Railroad
Stage
Loop
Alley
Bridge
Tunnel
Cemetery
Golf Course
Park
Hospital
Church
School
Post Office
Fire Station
Police Station
Library
Airport
Bus Station
Ferry
Lighthouse
Marina
Campground
Picnic Area
Rest Area
Scenic Overlook
Historic Site
Monument
Memorial
Museum
Zoo
Aquarium
Stadium
Arena
Theater
Casino
Hotel
Motel
Restaurant
Bar
Cafe
Bakery
Grocery Store
Supermarket
Convenience Store
Gas Station
Car Wash
Auto Repair
Auto Parts
Tire Store
Bicycle Shop
Sporting Goods
Clothing Store
Shoe Store
Jewelry Store
Bookstore
Gift Shop
Florist
Pet Store
Hardware Store
Furniture Store
Appliance Store
Electronics Store
Music Store
Video Store
Pharmacy
Drug Store
Liquor Store
Tobacco Store
Newsstand
Laundromat
Dry Cleaner
Barber Shop
Beauty Salon
Spa
Gym
Fitness Center
Swimming Pool
Tennis Court
Basketball Court
Baseball Field
Soccer Field
Football Field
Golf Course
Bowling Alley
Skating Rink
Ski Area
Marina
Boat Ramp
Fishing Pier
Beach

east side of Bear Creek. To the south of Medford, there is Mount Ashland, with an elevation of over 7500 feet, and to the east, there is Mount McLaughlin, with an elevation of nearly 9500 feet.

Soils in the area are generally clay loams and gravelly clays. Native vegetation includes oak and ponderosa pine trees, as well as Idaho fescue.

## 2.3 Principal Flood Problems

The worst flooding in recent years occurred in Medford in December 1962. The flow in Bear Creek near Main Street was recorded as being 14,500 cubic feet per second (cfs). According to the U.S. Geological Survey, when U.S. Water Resources Council guidelines are applied to this situation, the 1962 flood in Medford can be expected to occur once in every 44 years (References 2 and 3). This flood caused water to spill onto the floors of some shops along Bear Creek, especially in the area between Barnett Road and Main Street. The situation in 1962 was further aggravated by a canal levee break near where a canal crosses Crooked Creek. This increased the flow in Crooked Creek and added to the problems along Riverside Avenue, below Barnett Road. The 1962 flood along Bear Creek did not cause extensive structural damage to buildings in Medford other than damage caused by the high waters.

## 2.4 Flood Protection Measures

The Emigrant Dam upstream on Bear Creek is a U.S. Bureau of Reclamation project and provides virtually no flood control on Bear Creek for a major flood. There are no other flood-control measures in the Medford area and none are planned.

Since the 1962 flood event and a lesser flood event in 1964, there have been several reports on the drainage problems in the Medford area (References 4, 5, and 6). In general, these reports were aimed at relieving damage from a 10-year flood. Peak flows developed as part of these reports have been used as the basis of design for some of the recent drainage structures built in Medford. Residences have been built directly over the drainage structures and residents have constructed high, solid wooden fences around their property (Figures 2 through 7).

On both the east and west sides of the city, there are irrigation canals that are built above the existing normal ground slope and act as runoff diversion structures. In time of flood, the diversion gates from these canals are supposed to open into the natural drainage courses; however, this is not always the case.

Figure 2. Culvert Located on Long Pine Creek in Northeast Medford (This Culvert Was Designed to Accommodate a 10-Year Flood and There is No Provision for Flows in Excess of That Amount)

Figure 3. Three Culverts on Lone Pine Creek in Northeast Medford (This Culvert Was Designed to Carry a 10-Year Flood)

Figure 4. Culvert on Lone Pine Creek in Northeast Medford (The Culvert Goes Between the Two Houses, and, at the Present Time, Excess Flow Could Pass Between the Houses and End Up Back in Lone Pine Creek)

Figure 5. Bear Creek as it Flows Through Downtown Medford (A 100-Year Flood Will Just Touch the Bottom of the Bridge, shown crossing stream, on Eighth Street)

Figure 6. Eighth Street Bridge Over the Bear Creek During the 1962 Flood (During This Flood, Some of the Shops Just East of This Bridge Had as Much as 1 Foot of Water Above the Floors. There is Approximately a 2 Percent Chance of a Flood of This Magnitude Reoccurring Each Year on Bear Creek)

Figure 7. Crooked Creek Just Before It Flows Under Riverside Avenue (During Major Floods, Such as in 1962 and 1964, This Creek Overflowed, Causing High Water in the Shops Along Riverside Avenue)

Past flood situations in other areas of Jackson County indicate that, in practice, these types of diversion structures are sometimes closed or partially closed at the time of a flood. There have also been instances of dike failures and debris jamming in the canals. A failure of one of these structures could result in local flooding in excess of what is indicated in this study.

## 3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude which are expected to be equalled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for flood plain management and for flood insurance premium rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10, 2, 1, and 0.2 percent chance, respectively, of being equalled or exceeded during any year. Although the recurrence interval represents the long term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood which equals or exceeds the 100-year flood (1 percent chance of annual occurrence) in any 50-year period is approximately 40 percent (4 in 10), and, for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported here reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

### 3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for floods of the selected recurrence intervals for each stream studied in detail in the community.

The U.S. Geological Survey maintains a number of gaging stations in Jackson County. U.S. Geological Survey stream gage No. 14-357500 in Medford has been maintained for 55 years.

On special request, the U.S. Geological Survey performed computerized analyses of the floodflows at all gaging stations for which there were records of sufficient duration to permit meaningful analyses (Reference 2). Stations subject to extensive regulation were excluded from these analyses. In conjunction with these analyses, the U.S. Geological Survey applied regional skew factors in accordance with the recommendations of the U.S. Water Resources Council (Reference 3). On the basis of the observed peak flows and these regional skew factors, the U.S. Geological Survey derived the peak

flows for this study. These flows have been divided into two groups, large streams and small streams, with the dividing line being drainage areas of over or under 100 square miles. From this data, the following series of drainage area versus peak flow regression equations were derived:

Large Drainage Areas (Over 100 Square Miles)

$$Q_{10} = 3416\ A^{0.273}$$

$$Q_{50} = 2418\ A^{0.440}$$

$$Q_{100} = 2232\ A^{0.491}$$

$$Q_{500} = 2034\ A^{0.579}$$

Small Drainage Areas (Under 100 Square Miles)

$$Q_{10} = 194\ A^{0.437}$$

$$Q_{50} = 506\ A^{0.370}$$

$$Q_{100} = 699\ A^{0.354}$$

$$Q_{500} = 1306\ A^{0.337}$$

Bear Creek Drainage Only

$$Q_{10} = 54.8\ A^{0.85}$$

$$Q_{50} = 125.0\ A^{0.85}$$

$$Q_{100} = 166.0\ A^{0.85}$$

$$Q_{500} = 287.4\ A^{0.85}$$

where Q = peak discharge (cfs) and A = area (square miles)

These regression equations were then used directly for those situations in which there were no streamflow records.

The flows in cubic feet per second used for Lone Pine Creek, Lazy Creek, Larson Creek, Unnamed Tributary to Larson Creek, and Crooked Creek were calculated based on small drainage area regression equations.

Peak discharge-drainage area relationships for Bear Creek, Lone Pine Creek, Lazy Creek, Larson Creek, Unnamed Tributary to Larson Creek, and Crooked Creek are shown in Table 1.

## 3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of streams in the community were carried out to provide estimates of the elevations of floods of the selected recurrence intervals along each stream studied in the community.

Backwater analyses for the streams studied in detail were performed using the U.S. Army Corps of Engineers HEC-2 computer program (Reference 7).

Table 1. Summary of Discharges

| Flooding Source and Location | Drainage Area (Square Miles) | Peak Discharges (Cubic Feet per Second) 10-Year | 50-Year | 100-Year | 500-Year |
|---|---|---|---|---|---|
| Bear Creek | | | | | |
| At U.S. Geological Survey Stream Gage Number 14-357500, at Medford | 284 | 6,770 | 15,440 | 20,500 | 35,500 |
| Lone Pine Creek | | | | | |
| At Crater Lake Highway | 4.5 | 375 | 883 | 1,190 | 2,167 |
| Lazy Creek | | | | | |
| At Mouth | 5.2 | 399 | 931 | 1,253 | 2,275 |
| Larson Creek | | | | | |
| At Mouth | 7 | 455 | 1,039 | 1,392 | 2,514 |
| Unnamed Tributary to Larson Creek | | | | | |
| At Confluence With Larson Creek | 4.4 | 370 | 875 | 1,181 | 2,151 |
| Crooked Creek | | | | | |
| At Mouth | 5.6 | 413 | 957 | 1,286 | 2,332 |

Cross section information was obtained from digitized photogrammetric interpretations (Reference 8). All bridges and culverts were measured in the field, and all relevant irrigation structures were also field measured. Contour maps based on photogrammetry were used to define flood limits in the areas between the cross sections (Reference 9).

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles (Exhibit 1).

Roughness values (Manning's "n") for each reach were determined on the basis of field inspection, colored photographs of the streams at the time of inspection, and photogrammetric interpretation (Reference 8). For those cross sections extending into areas with numerous structures, the presence of structures was reflected by higher "n" values rather than attempting to model the existence of the structure in the cross section. Consequently, "n" values ranged from 0.025 to 0.050 for channel areas and from 0.025 to 0.070 for overbank areas where there was extensive development.

Flood profiles were drawn showing computed water-surface elevations to an accuracy of 0.5 foot for floods of the selected recurrence intervals (Exhibit 1).

Starting water-surface elevations on the Rogue River were established by assuming critical flow at the Savage Rapids Dam, located on the Jackson County line. Starting elevations on Bear Creek and its tributaries, which are tributaries to the Rouge River, were then taken from the analysis of the Rogue River.

For Lone Pine Creek, the Crater Lake Highway acted as the downstream control, and critical flow over the highway was assumed for those flows that would not pass through the existing culvert.

Depths of shallow flooding areas were estimated on the basis of field investigation and engineering calculations performed in connection with subdivision development.

Approximate elevations were determined by the use of historical records and aerial photogrammetric interpretation (Reference 8).

All elevations are referenced to the National Geodetic Vertical Datum of 1929 (NGVD). Elevation reference marks used in the study are shown on the maps.

The National Geodetic Vertical Datum is .6 feet higher than the City of Medford elevation datum.

## 4.0 FLOOD PLAIN MANAGEMENT APPLICATIONS

A prime purpose of the National Flood Insurance Program is to encourage State and local governments to adopt sound flood plain management programs. Each Flood Insurance Study, therefore, includes a flood boundary map designed to assist communities in developing sound flood plain management measures.

### 4.1 Flood Boundaries

In order to provide a national standard without regional discrimination, the 100-year flood has been adopted by the Federal Insurance Administration as the base flood for purposes of flood plain management measures. The 500-year flood is employed to indicate additional areas of flood risk in the community. For each stream studied in detail, the boundaries of the 100- and 500-year floods have been delineated using the flood elevations determined at each cross section; between cross sections, the boundaries were interpolated using topographic maps at a scale of 1:4800, with a contour interval of 3 feet (Reference 9).

In cases where the 100- and 500-year flood boundaries are close together, only the 100-year flood boundary has been shown.

Shallow flooding areas were delineated on topographic maps (Reference 9).

Approximate flood boundaries in some portions of the study area were taken from the Federal Insurance Administration's Flood Hazard Boundary Map (Reference 10).

The Federal Insurance Administration's Regional Representative, in cooperation with community officials, has determined that some flood boundaries shown on the Federal Insurance Administration's Flood Hazard Boundary Map (Reference 10) permanently narrow to less than 200 feet in width; therefore, they were not delineated on the maps.

Flood boundaries are indicated on the Flood Insurance Rate Map (Exhibit 2). On this map, the 100-year flood boundary corresponds to the boundary of the areas of special flood hazards (Zones A, A0, A2, A3, A4, A8, A10, A12, A13, and A14); and the 500-year flood boundary corresponds to the boundary of the areas of moderate flood hazards (Zone B).

Small areas within the flood boundaries may lie above the flood elevations and, therefore, not be subject to flooding; owing to limitations of the map scale, such areas are not shown.

## 4.2 Floodways

Encroachment on flood plains, such as artificial fill, reduces the flood-carrying capacity and increases flood heights, thus increasing flood hazards in areas beyond the encroachment itself. One aspect of flood plain management involves balancing the economic gain from flood plain development against the resulting increase in flood hazard. For purposes of the National Flood Insurance Program, the concept of a floodway is used as a tool to assist local communities in this aspect of flood plain management. Under this concept, the area of the 100-year flood is divided into a floodway and a floodway fringe. The floodway is the channel of a stream, plus any adjacent flood plain areas, that must be kept free of encroachment in order that the 100-year flood be carried without substantial increases in flood heights. As minimum standards, the Federal Insurance Administration limits such increases in flood heights to 1.0 foot, provided that hazardous velocities are not produced.

The floodway for Bear Creek was computed on the basis of equal conveyance reduction where feasible. Otherwise, method 2 of the HEC-2 program was employed (Reference 7).

It was determined that the floodway would be contained in the channel for Lazy Creek, Larson Creek, Unnamed Tributary to Larsen Creek, Lone Pine Creek, and Crooked Creek, therefore, no floodway is shown.

The results of these computations are tabulated at selected cross sections for each stream segment for which a floodway is computed (Table 2).

As shown on the Flood Boundary and Floodway Map (Exhibit 2), the floodway boundaries were determined at cross sections; between cross sections, the boundaries were interpolated. In cases where the floodway and 100-year flood boundaries are close together, only the floodway boundary has been shown.

The area between the floodway and the boundary of the 100-year flood is termed the floodway fringe. The floodway fringe thus encompasses the portion of the flood plain that could be completely obstructed without increasing the water-surface elevation of the 100-year flood more than 1.0 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to flood plain development are shown in Figure 8.

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER SURFACE ELEVATION | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| | | | | | | (FEET NGVD) | | |
| Bear Creek | | | | | | | | |
| A | 35,160 | 322/135[2] | 3,407 | 6.3 | 1,290.6 | 1,290.6 | 1,291.5 | 0.9 |
| B | 36,460 | 144 | 1,493 | 14.3 | 1,298.8 | 1,298.8 | 1,298.8 | 0.0 |
| C | 36,810 | 160/30[2] | 2,253 | 9.5 | 1,301.8 | 1,301.8 | 1,302.7 | 0.9 |
| D | 38,250 | 558 | 5,455 | 3.9 | 1,306.6 | 1,306.6 | 1,307.3 | 0.7 |
| E | 39,070 | 457 | 3,151 | 6.6 | 1,307.5 | 1,307.5 | 1,308.0 | 0.5 |
| F | 39,460 | 199 | 1,676 | 12.4 | 1,308.3 | 1,308.3 | 1,308.3 | 0.0 |
| G | 39,650 | 150 | 1,512 | 13.8 | 1,310.8 | 1,310.8 | 1,311.1 | 0.3 |
| H | 39,760 | 150 | 2,046 | 10.2 | 1,313.7 | 1,313.7 | 1,314.7 | 1.0 |
| I | 40,620 | 198 | 2,722 | 7.6 | 1,320.1 | 1,320.1 | 1,320.6 | 0.5 |
| J | 41,420 | 533 | 5,870 | 3.5 | 1,322.4 | 1,322.4 | 1,322.8 | 0.4 |
| K | 42,270 | 310 | 2,017 | 10.3 | 1,323.4 | 1,323.4 | 1,323.4 | 0.0 |
| L | 42,850 | 203 | 1,784 | 11.7 | 1,327.8 | 1,327.8 | 1,327.8 | 0.0 |
| M | 43,060 | 175 | 2,487 | 8.4 | 1,330.2 | 1,330.2 | 1,330.7 | 0.5 |
| N | 43,580 | 265 | 3,489 | 6.0 | 1,332.2 | 1,332.2 | 1,332.4 | 0.2 |
| O | 44,180 | 325 | 2,853 | 7.3 | 1,332.3 | 1,332.3 | 1,332.8 | 0.5 |
| P | 45,740 | 120 | 1,269 | 16.4 | 1,337.6 | 1,337.6 | 1,337.6 | 0.0 |
| Q | 46,390 | 150 | 1,734 | 12.0 | 1,342.0 | 1,342.0 | 1,342.0 | 0.0 |
| R | 46,700 | 176 | 2,516 | 8.3 | 1,345.2 | 1,345.2 | 1,345.5 | 0.3 |
| S | 46,720 | 176 | 1,552 | 13.4 | 1,345.2 | 1,345.2 | 1,345.2 | 0.0 |
| T | 46,850 | 131 | 1,311 | 15.9 | 1,345.2 | 1,345.2 | 1,345.2 | 0.0 |
| U | 47,190 | 136 | 1,394 | 14.9 | 1,346.9 | 1,346.9 | 1,347.9 | 1.0 |
| V | 48,090 | 170 | 1,437 | 14.3 | 1,350.9 | 1,350.9 | 1,351.7 | 0.8 |
| W | 48,240 | 154 | 1,445 | 14.2 | 1,353.6 | 1,353.6 | 1,353.6 | 0.0 |
| X | 48,570 | 143 | 1,458 | 14.1 | 1,355.5 | 1,355.5 | 1,355.5 | 0.0 |
| Y | 49,470 | 143 | 1,561 | 13.1 | 1,360.3 | 1,360.3 | 1,360.3 | 0.0 |
| Z | 50,090 | 227 | 1,879 | 10.9 | 1,362.7 | 1,362.7 | 1,362.7 | 0.0 |

[1]Feet Above Kirtland Road [2]Width/Width Within Corporate Limits

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

**CITY OF MEDFORD, OR**
(JACKSON CO.)

**FLOODWAY DATA**

**BEAR CREEK**

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER SURFACE ELEVATION | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| | | | | | (FEET NGVD) | | | |
| Bear Creek (continued) | | | | | | | | |
| AA | 51,480 | 291 | 1,983 | 10.3 | 1,368.6 | 1,368.6 | 1,368.6 | 0.0 |
| AB | 52,170 | 350 | 3,982 | 5.1 | 1,372.5 | 1,372.5 | 1,372.6 | 0.1 |
| AC | 52,530 | 313 | 2,592 | 7.9 | 1,372.6 | 1,372.6 | 1,372.6 | 0.0 |
| AD | 54,030 | 350 | 2,279 | 8.9 | 1,375.1 | 1,375.1 | 1,376.1 | 1.0 |
| AE | 55,375 | 152 | 1,556 | 13.1 | 1,385.8 | 1,385.8 | 1,385.8 | 0.0 |
| AF | 55,770 | 304 | 2,283 | 8.8 | 1,391.9 | 1,391.9 | 1,391.9 | 0.0 |

[1]Feet Above Confluence With Rogue River

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

**CITY OF MEDFORD, OR**
**(JACKSON CO.)**

**FLOODWAY DATA**

**BEAR CREEK**

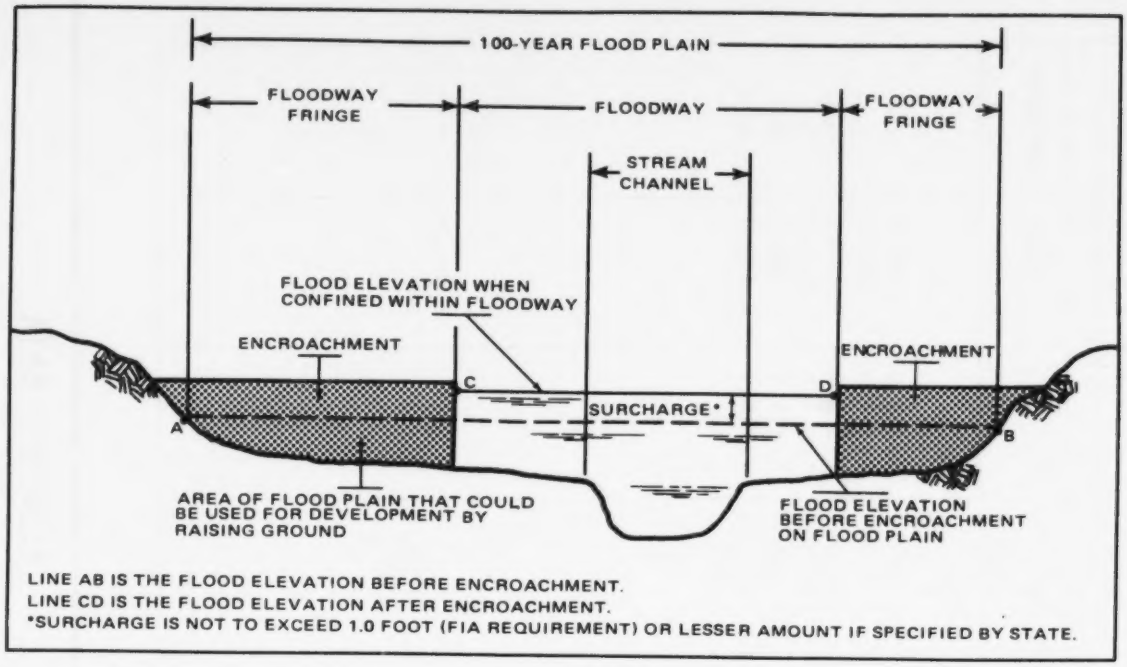

100-YEAR FLOOD PLAIN
FLOODWAY FRINGE
FLOODWAY
FLOODWAY FRINGE
STREAM CHANNEL
FLOOD ELEVATION WHEN CONFINED WITHIN FLOODWAY
ENCROACHMENT
ENCROACHMENT
C
D
SURCHARGE*
A
B
AREA OF FLOOD PLAIN THAT COULD BE USED FOR DEVELOPMENT BY RAISING GROUND
FLOOD ELEVATION BEFORE ENCROACHMENT ON FLOOD PLAIN
LINE AB IS THE FLOOD ELEVATION BEFORE ENCROACHMENT.
LINE CD IS THE FLOOD ELEVATION AFTER ENCROACHMENT.
*SURCHARGE IS NOT TO EXCEED 1.0 FOOT (FIA REQUIREMENT) OR LESSER AMOUNT IF SPECIFIED BY STATE.

Figure 8. Floodway Schematic

## 5.0 INSURANCE APPLICATION

In order to establish actuarial insurance rates, the Federal Insurance Administration has developed a process to transform the data from the engineering study into flood insurance criteria. This process includes the determination of reaches, Flood Hazard Factors, and flood insurance zone designations for each flooding source studied in detail affecting the City of Medford.

### 5.1 Reach Determinations

Reaches are defined as lengths of watercourses having relatively the same flood hazard, based on the average weighted difference in water-surface elevations between the 10- and 100-year floods. This difference does not have a variation greater than that indicated in the following table for more than 20 percent of the reach:

| Average Difference Between 10- and 100-year Floods | Variation |
|---|---|
| Less than 2 feet | 0.5 foot |
| 2 to 7 feet | 1.0 foot |
| 7.1 to 12 feet | 2.0 feet |
| More than 12 feet | 3.0 feet |

The locations of the reaches determined for the flooding sources of the City of Medford are shown on the Flood Profiles (Exhibit 1) and summarized in Table 3.

## 5.2 Flood Hazard Factors

The Flood Hazard Factor (FHF) is the Federal Insurance Administration device used to correlate flood information with insurance rate tables. Correlations between property damage from floods and their FHF are used to set actuarial insurance premium rate tables based on FHFs from 005 to 200.

The FHF for a reach is the average weighted difference between the 10- and 100-year flood water-surface elevations expressed to the nearest one-half foot, and shown as a three-digit code. For example, if the difference between water-surface elevations of the 10- and 100-year floods is 0.7 foot, the FHF is 005; if the difference is 1.4 feet, the FHF is 015; if the difference is 5.0 feet, the FHF is 050. When the difference between the 10- and 100-year water-surface elevations is greater than 10.0 feet, accuracy for the FHF is to the nearest foot.

## 5.3 Flood Insurance Zones

After the determination of reaches and their respective Flood Hazard Factors, the entire incorporated area of the City of Medford was divided into zones, each having a specific flood potential or hazard. Each zone was assigned one of the following flood insurance zone designations:

| | |
|---|---|
| Zone A: | Special Flood Hazard Areas inundated by the 100-year flood, determined by approximate methods; no base flood elevations shown or Flood Hazard Factors determined. |
| Zone A0: | Special Flood Hazard Areas inundated by types of 100-year shallow flooding where depths are between 1.0 and 3.0 feet; depths are shown, but no Flood Hazard Factors are determined. |
| Zones A2, A3, A4, A8, A10, A12, A13, and A14: | Special Flood Hazard Areas inundated by the 100-year flood, determined by detailed methods; base flood elevations shown, and zones subdivided according to Flood Hazard Factors. |

| FLOODING SOURCE | PANEL[1] | ELEVATION DIFFERENCE[2] BETWEEN 1% (100-YEAR) FLOOD AND | | | FLOOD HAZARD FACTOR | ZONE | BASE FLOOD ELEVATION (FEET NGVD)[3] |
|---|---|---|---|---|---|---|---|
| | | 10% (10-YEAR) | 2% (50-YEAR) | 0.2% (500-YEAR) | | | |
| Bear Creek | | | | | | | |
| Reach 1 | 0002,0004 0007,0008 | -6.25 | -2.02 | 4.24 | 065 | A13 | Varies - See Map |
| Reach 2 | 0008 | -6.10 | -1.80 | 5.37 | 060 | A12 | Varies - See Map |
| Reach 3 | 0008 | -6.80 | -1.95 | 3.79 | 070 | A14 | Varies - See Map |
| Reach 4 | 0008 | -3.88 | -1.15 | 2.28 | 040 | A8 | Varies - See Map |
| Larson Creek | | | | | | | |
| Reach 1[4] | 0008 | -5.91 | -2.33 | 3.86 | 060 | A12 | Varies - See Map |
| Reach 2[4] | 0008 | -4.79 | -1.22 | 3.56 | 050 | A10 | Varies - See Map |
| Reach 3 | 0008 | -1.68 | -0.51 | 1.28 | 015 | A3 | Varies - See Map |
| Unnamed Tributary to Larson Creek | | | | | | | |
| Reach 1 | 0008 | -1.68 | -0.51 | 1.28 | 015 | A3 | Varies - See Map |
| Lazy Creek | | | | | | | |
| Reach 1 | 0008 | -3.95 | -1.61 | 4.27 | 040 | A8 | Varies - See Map |
| Reach 2 | 0005,0008 | -1.69 | -0.48 | 1.06 | 015 | A3 | Varies - See Map |
| Crooked Creek | | | | | | | |
| Reach 1 | 0008 | -5.79 | -2.29 | 3.68 | 060 | A12 | Varies - See Map |
| Reach 2 | 0007 | -2.21 | -0.71 | 0.63 | 020 | A4 | Varies - See Map |
| Reach 3 | 0007 | -1.15 | -0.28 | 0.65 | 010 | A2 | Varies - See Map |

[1]Flood Insurance Rate Map Panel [2]Weighted Average [3]Rounded to Nearest Foot
[4]Zones A10 and A12 are Located Outside Corporate Limits

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

**CITY OF MEDFORD, OR**
(JACKSON CO.)

## FLOOD INSURANCE ZONE DATA

**BEAR CREEK-LARSON CREEK-UNNAMED TRIBUTARY TO LARSON CREEK-LAZY CREEK-CROOKED CREEK**

| FLOODING SOURCE | PANEL[1] | ELEVATION DIFFERENCE[2] BETWEEN 1% (100-YEAR) FLOOD AND | | | FLOOD HAZARD FACTOR | ZONE | BASE FLOOD ELEVATION (FEET NGVD)[3] |
|---|---|---|---|---|---|---|---|
| | | 10% (10-YEAR) | 2% (50-YEAR) | 0.2% (500-YEAR) | | | |
| Lone Pine Creek | | | | | | | |
| Reach 1 | 0002,0003 | -6.47 | -5.60 | 1.00 | 065 | A13 | Varies - See Map |
| Reach 2 | 0002,0003 | -3.90 | -3.29 | 1.01 | 040 | A8 | Varies - See Map |
| Reach 3 | 0003,0005 | -1.32 | -0.37 | 0.74 | 015 | A3 | Varies - See Map |
| Reach 4 | 0005 | -1.79 | -0.32 | 0.49 | 020 | A4 | Varies - See Map |
| Reach 5 | 0005 | -0.86 | -0.20 | 0.55 | 010 | A2 | Varies - See Map |
| Shallow Flooding | 0003 | N/A | N/A | N/A | N/A | A0 | Depth 2 |
| Shallow Flooding | 0005 | N/A | N/A | N/A | N/A | A0 | Depth 1 |

[1]Flood Insurance Rate Map Panel [2]Weighted Average [3]Rounded to Nearest Foot

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

**CITY OF MEDFORD, OR**
**(JACKSON CO.)**

**FLOOD INSURANCE ZONE DATA**

**LONE PINE CREEK-SHALLOW FLOODING AREAS**

| | |
|---|---|
| Zone B: | Areas between the Special Flood Hazard Areas and the limits of the 500-year flood, including areas of the 500-year flood plain that are protected from the 100-year flood by dike, levee, or other water control structure; also areas subject to certain types of 100-year shallow flooding where depths are less than 1.0 foot; and areas subject to 100-year flooding from sources with drainage areas less than 1 square mile. Zone B is not subdivided. |
| Zone C: | Areas of minimal flooding. |

The flood elevation differences, Flood Hazard Factors, flood insurance zones, and base flood elevations for each flooding source studied in detail in the community are summarized in Table 3.

### 5.4 Flood Insurance Rate Map Description

The Flood Insurance Rate Map for the City of Medford is, for insurance purposes, the principal result of the Flood Insurance Study. This map (published separately) contains the official delineation of flood insurance zones and base flood elevation lines. Base flood elevation lines show the locations of the expected whole-foot water-surface elevations of the base (100-year) flood. This map is developed in accordance with the latest flood insurance map preparation guidelines published by the Federal Insurance Administration.

## 6.0 OTHER STUDIES

The Federal Insurance Administration previously published a Flood Hazard Boundary Map for the City of Medford (Reference 10). This Flood Insurance Study is more detailed, and thus supersedes that map.

A Flood Insurance Study for the unincorporated areas of Jackson County, Oregon, is in progress (Reference 11) and is in agreement with this Flood Insurance Study.

Other reports relating to flooding and drainage problems in the Medford area are Preliminary Storm Drainage Study for Jackson County, Oregon; Bear Creek Valley Drainage Investigation Report; and Revised Report for Storm Drainage in Three Areas, 1966 Storm Sewer Program (References 4, 5, and 6, respectively).

This study is authoritative for the purposes of the National Flood Insurance Program; data presented herein either supersede or are compatible with all previous determinations.

## 7.0 LOCATION OF DATA

Survey, hydrologic, hydraulic, and other pertinent data used in this study can be obtained by contacting the Insurance and Mitigation Division, Federal Emergency Management Agency, Federal Regional Center, 130 228th Street, SW., Bothell, Washington 98011.

## 8.0 BIBLIOGRAPHY AND REFERENCES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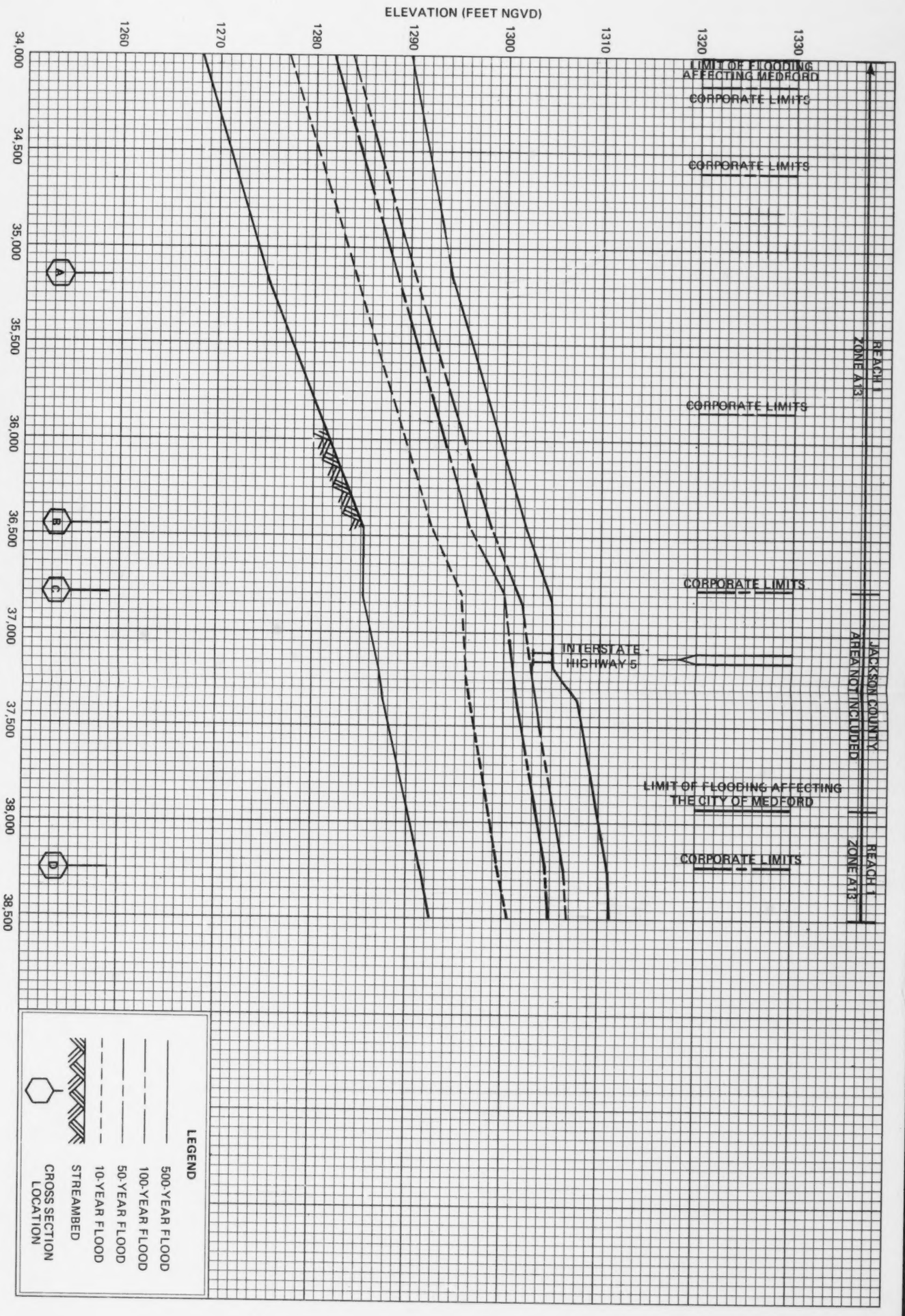


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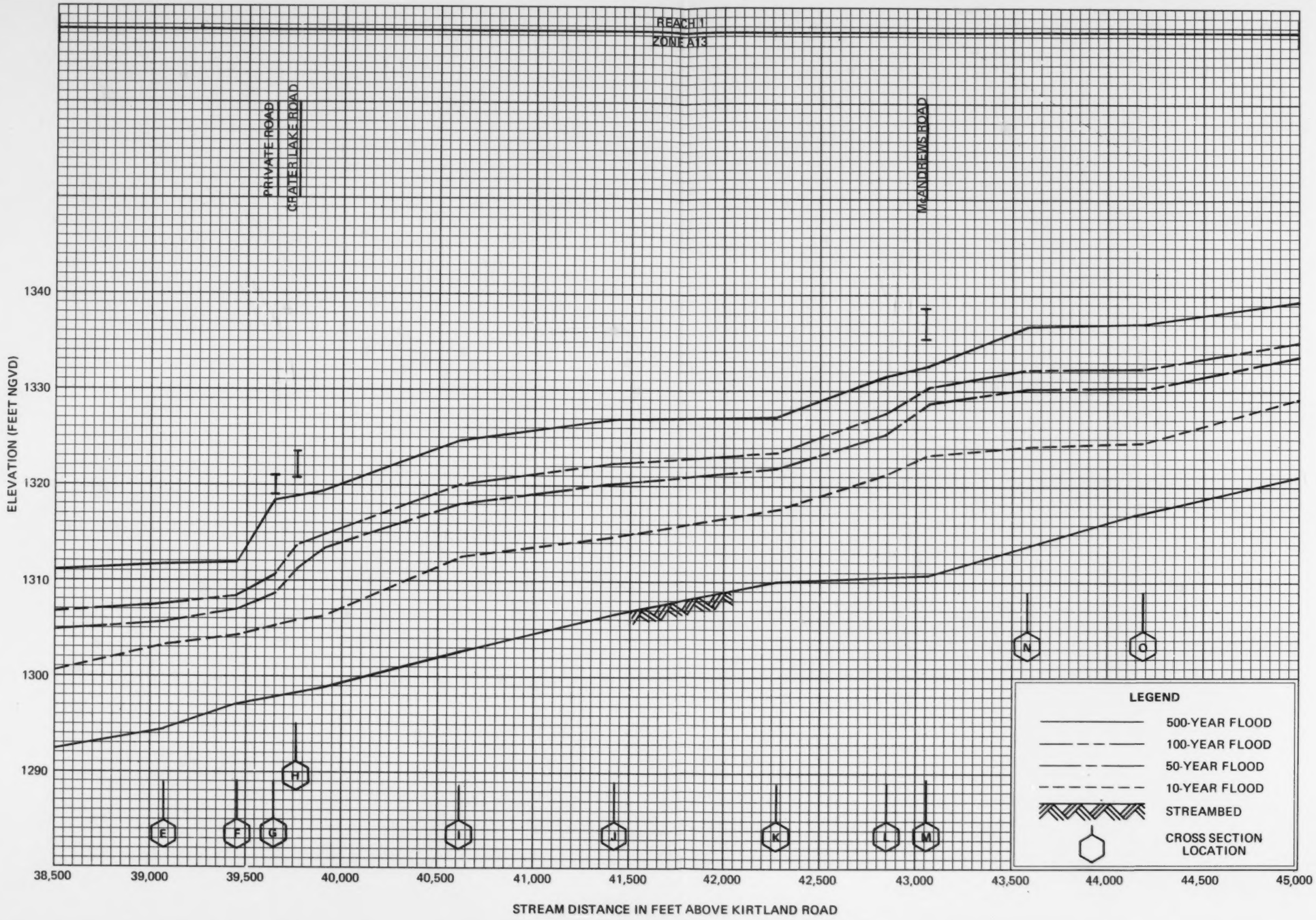
FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

**CITY OF MEDFORD, OR**
(JACKSON CO.)

**FLOOD PROFILES**

**BEAR CREEK**




FLOOD PROFILES

BEAR CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

CITY OF MEDFORD, OR
(JACKSON CO.)

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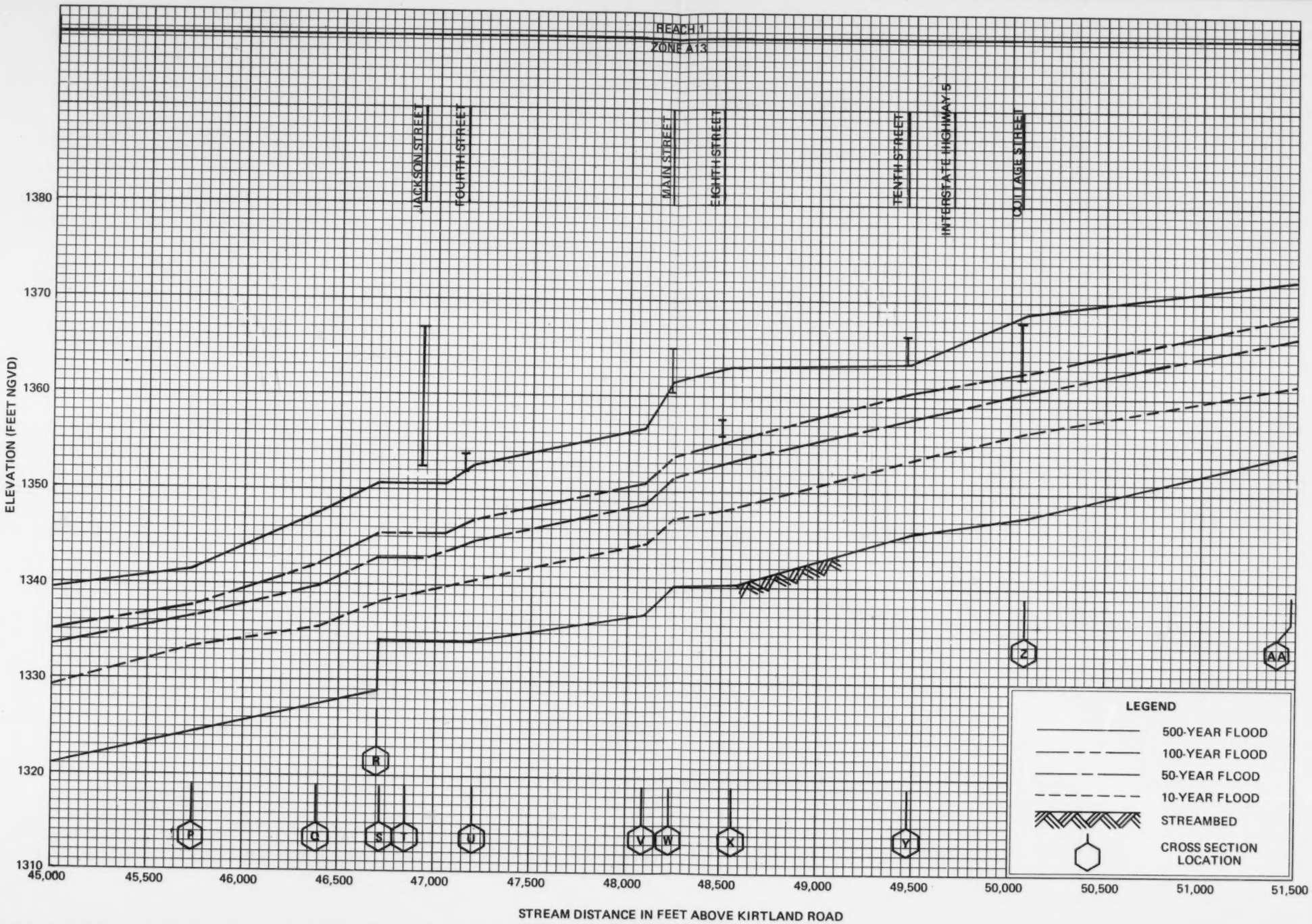


FLOOD PROFILES

BEAR CREEK

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Federal Insurance Administration

CITY OF MEDFORD, OR
(JACKSON CO.)

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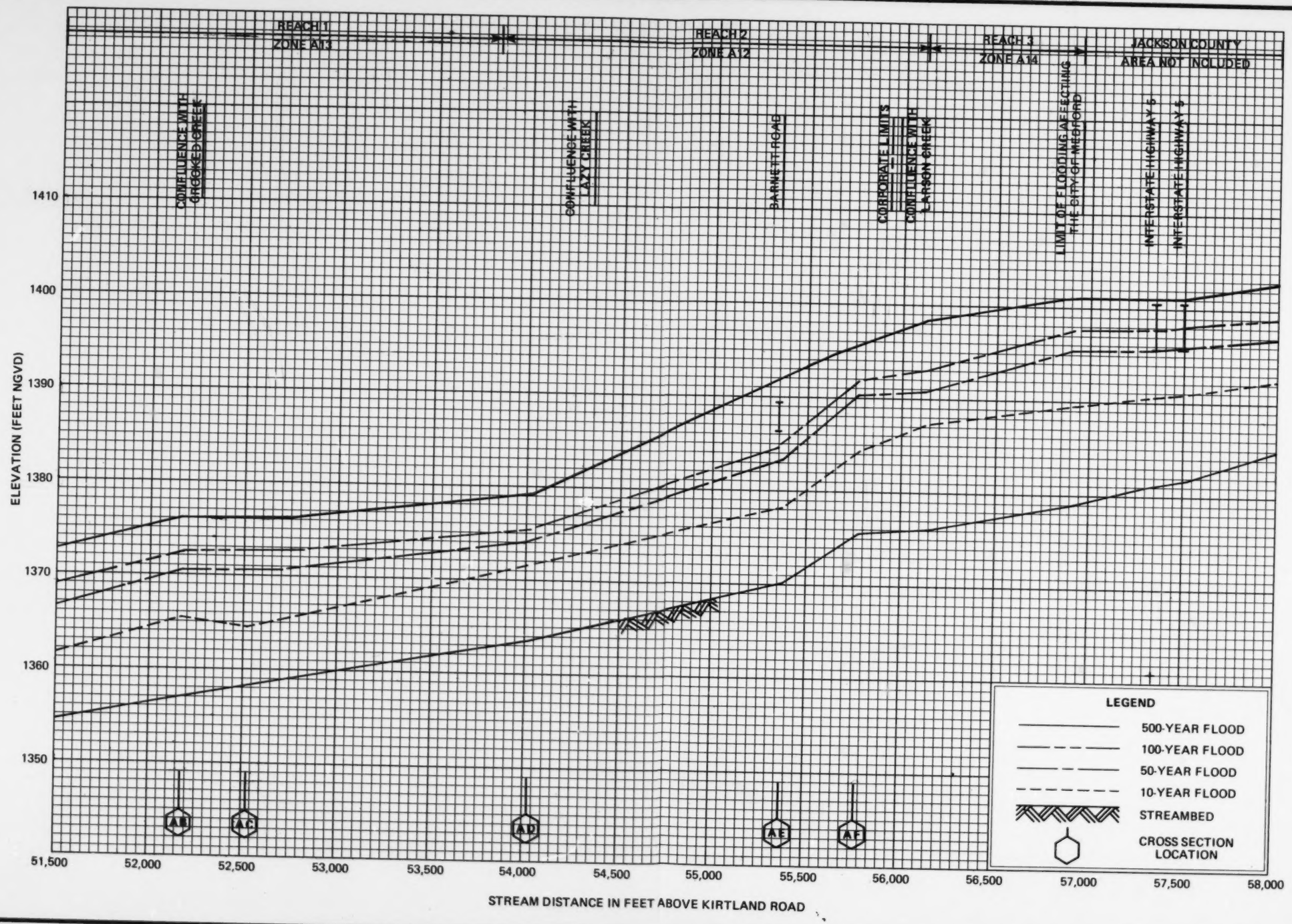


FLOOD PROFILES

BEAR CREEK

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Federal Insurance Administration

CITY OF MEDFORD, OR
(JACKSON CO.)

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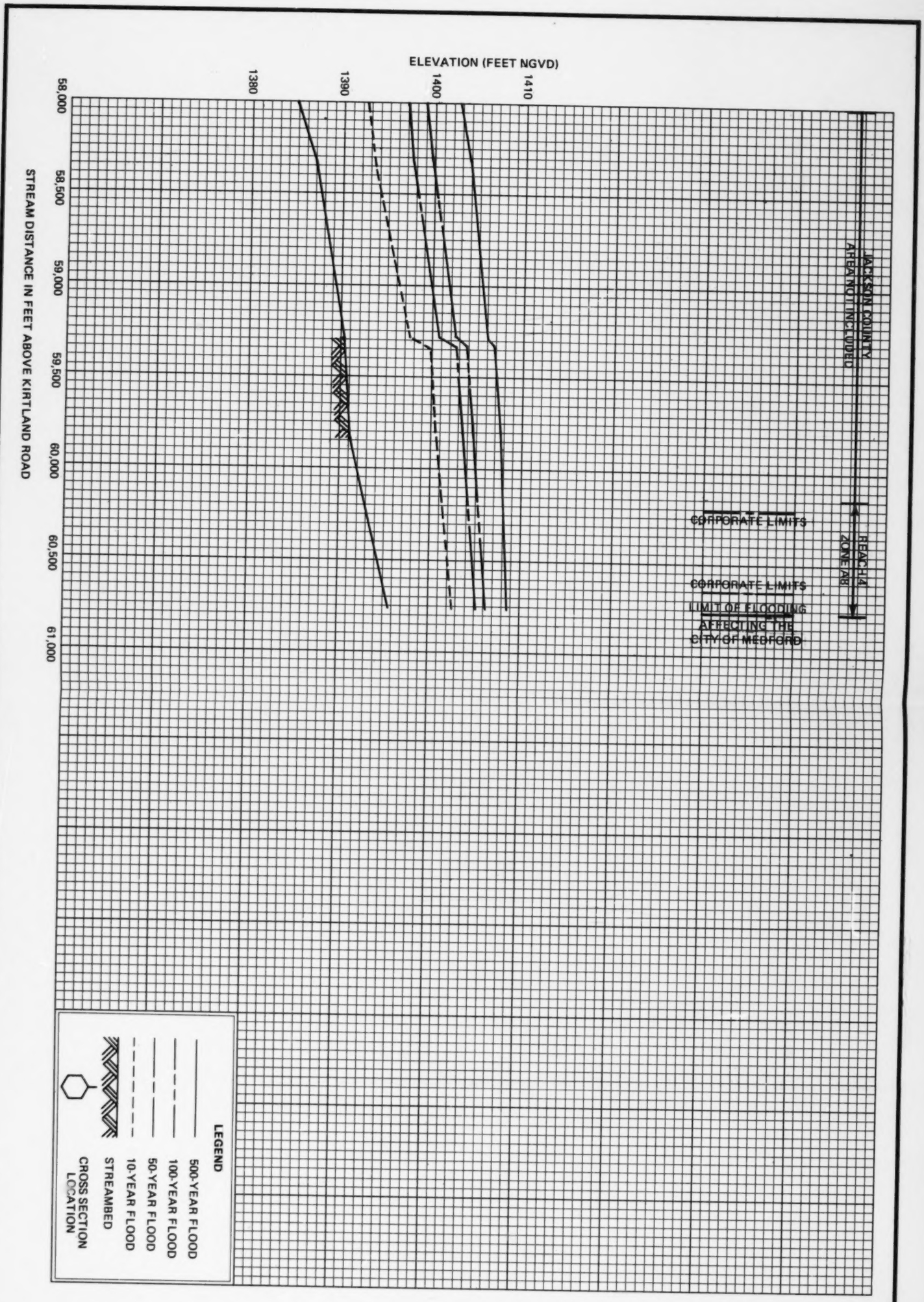


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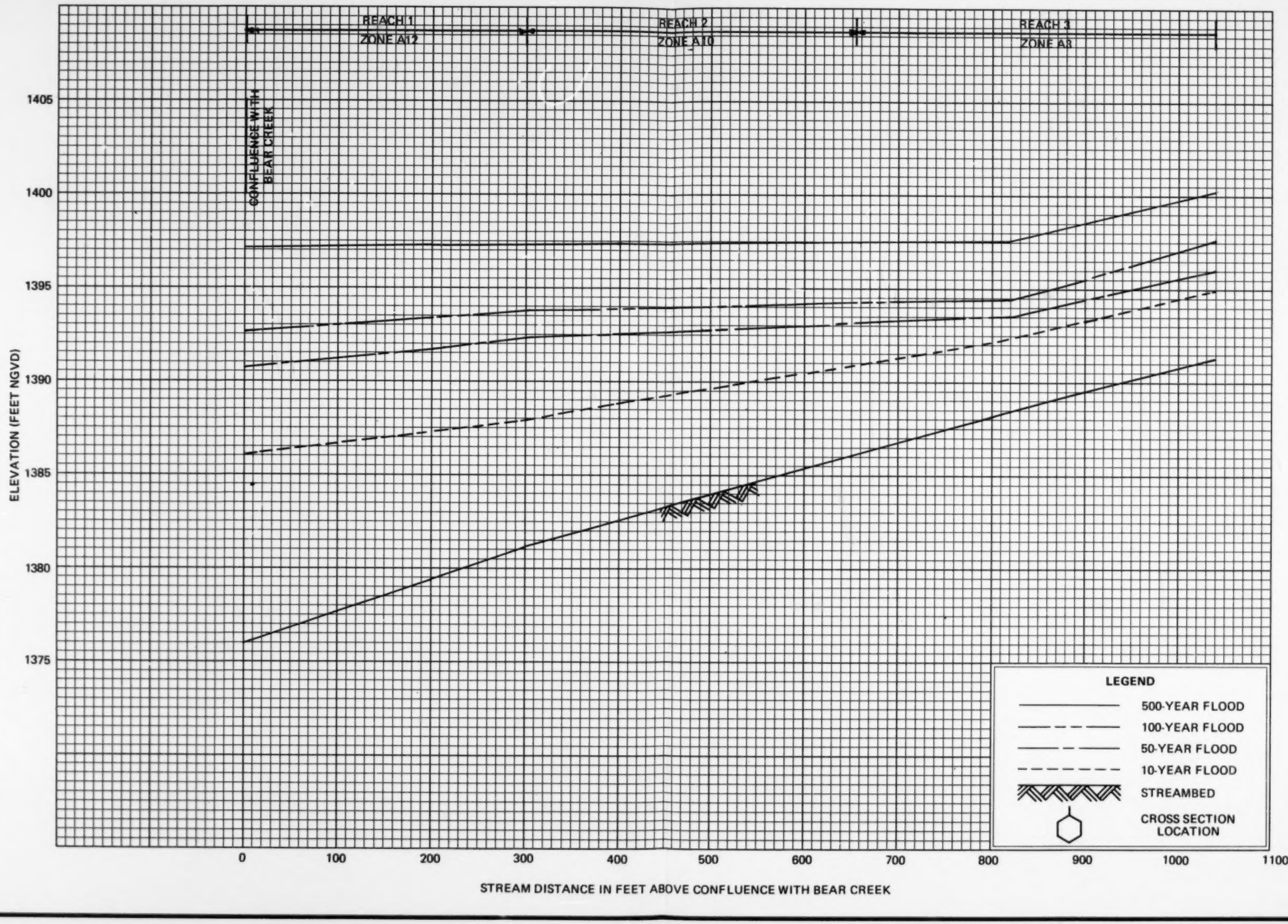
Federal Insurance Administration

**CITY OF MEDFORD, OR**
(JACKSON CO.)

**FLOOD PROFILES**

**BEAR CREEK**




FLOOD PROFILES

LARSON CREEK

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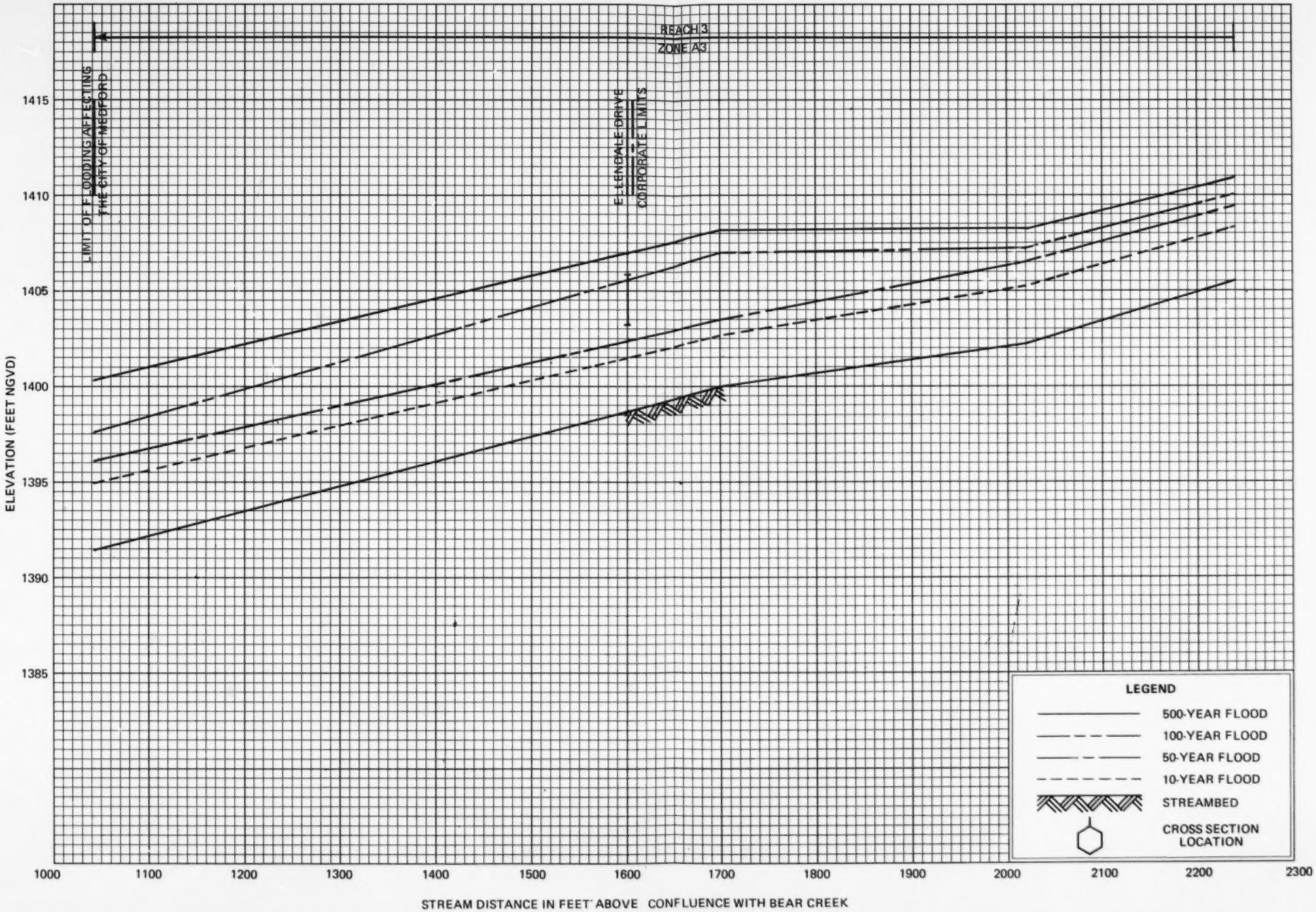


# FLOOD PROFILES

## LARSON CREEK

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(JACKSON CO.)

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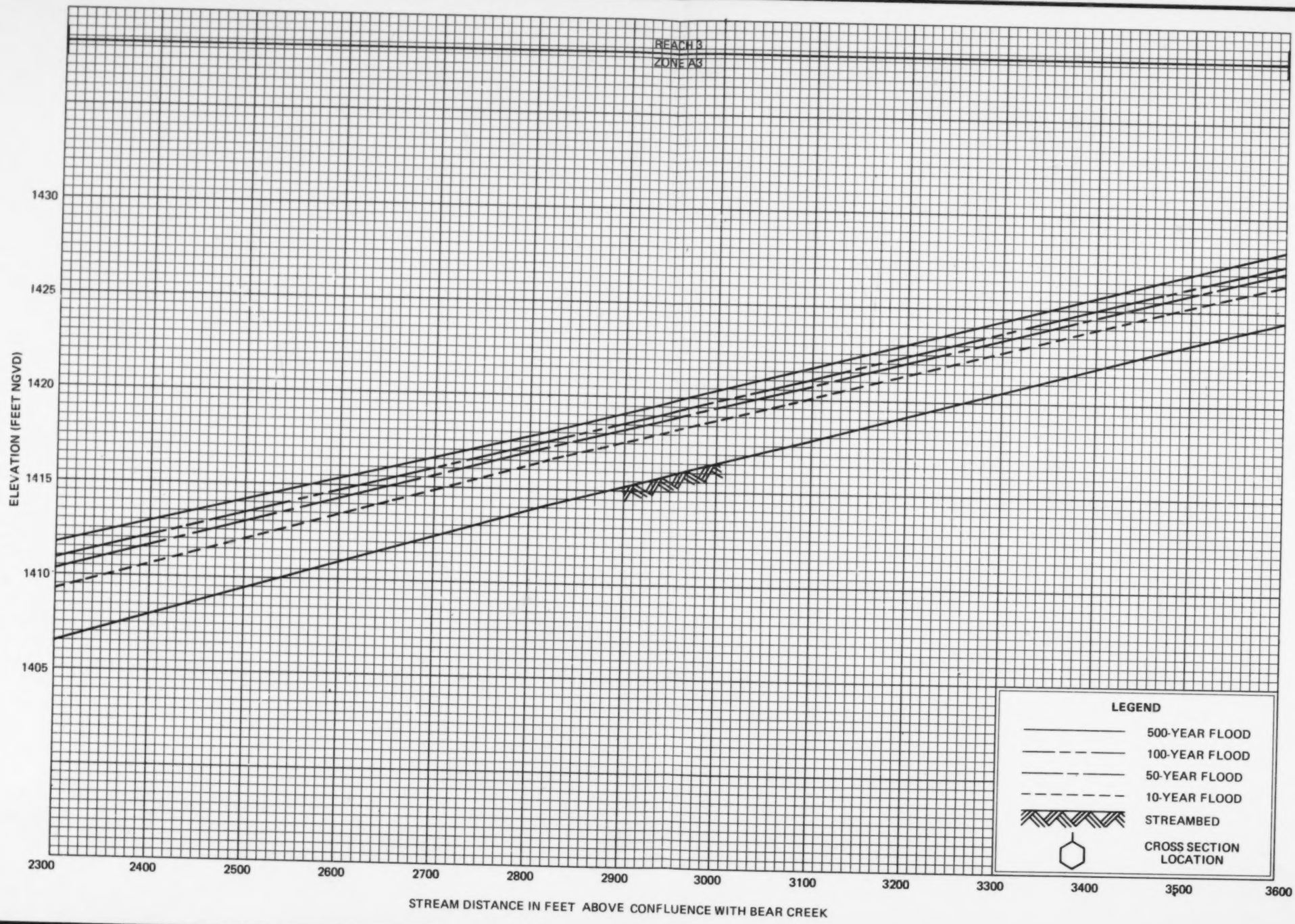


FLOOD PROFILES

LARSON CREEK

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CITY OF MEDFORD, OR
(JACKSON CO.)

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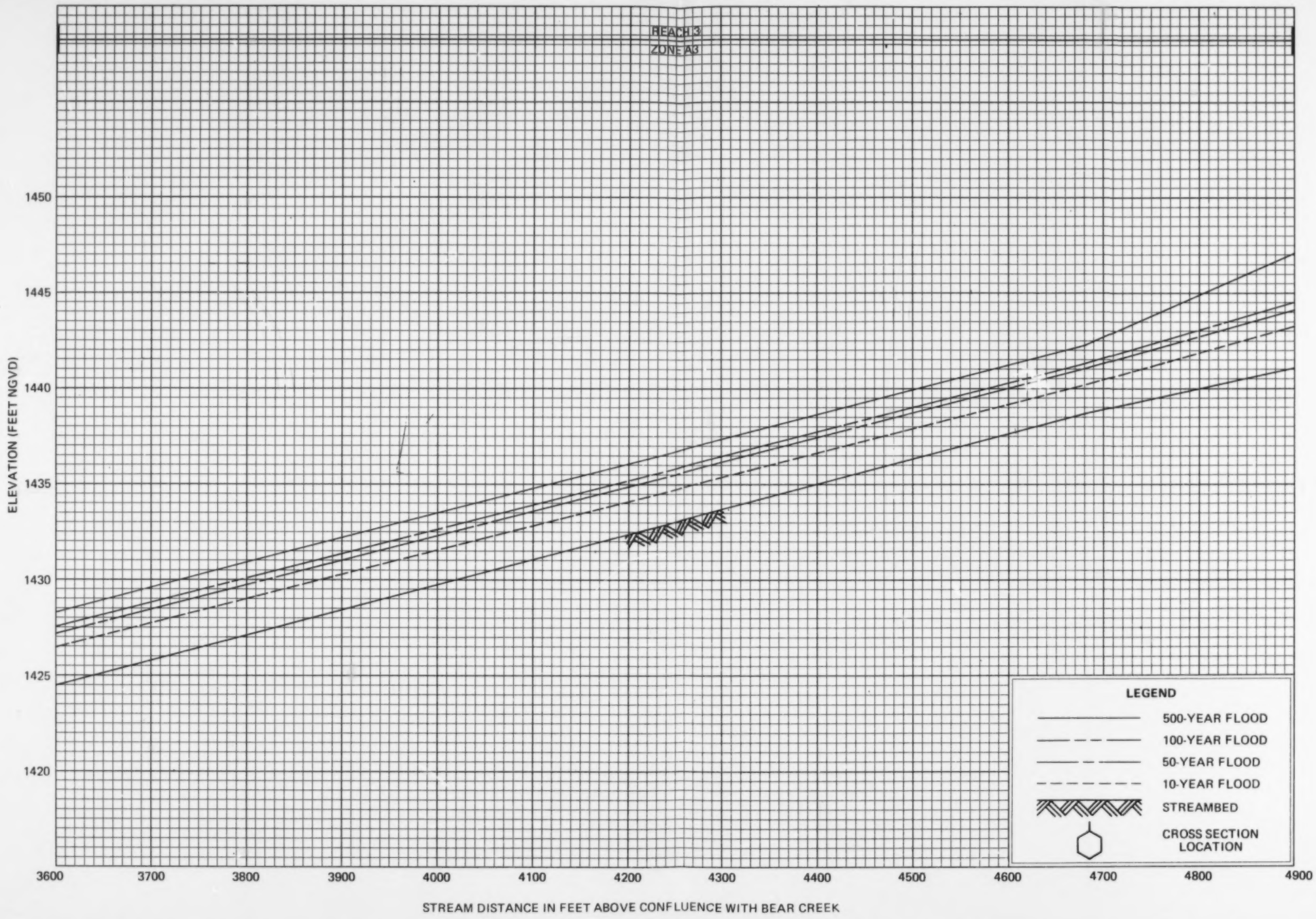


# FLOOD PROFILES

## LARSON CREEK

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**CITY OF MEDFORD, OR**
(JACKSON CO.)

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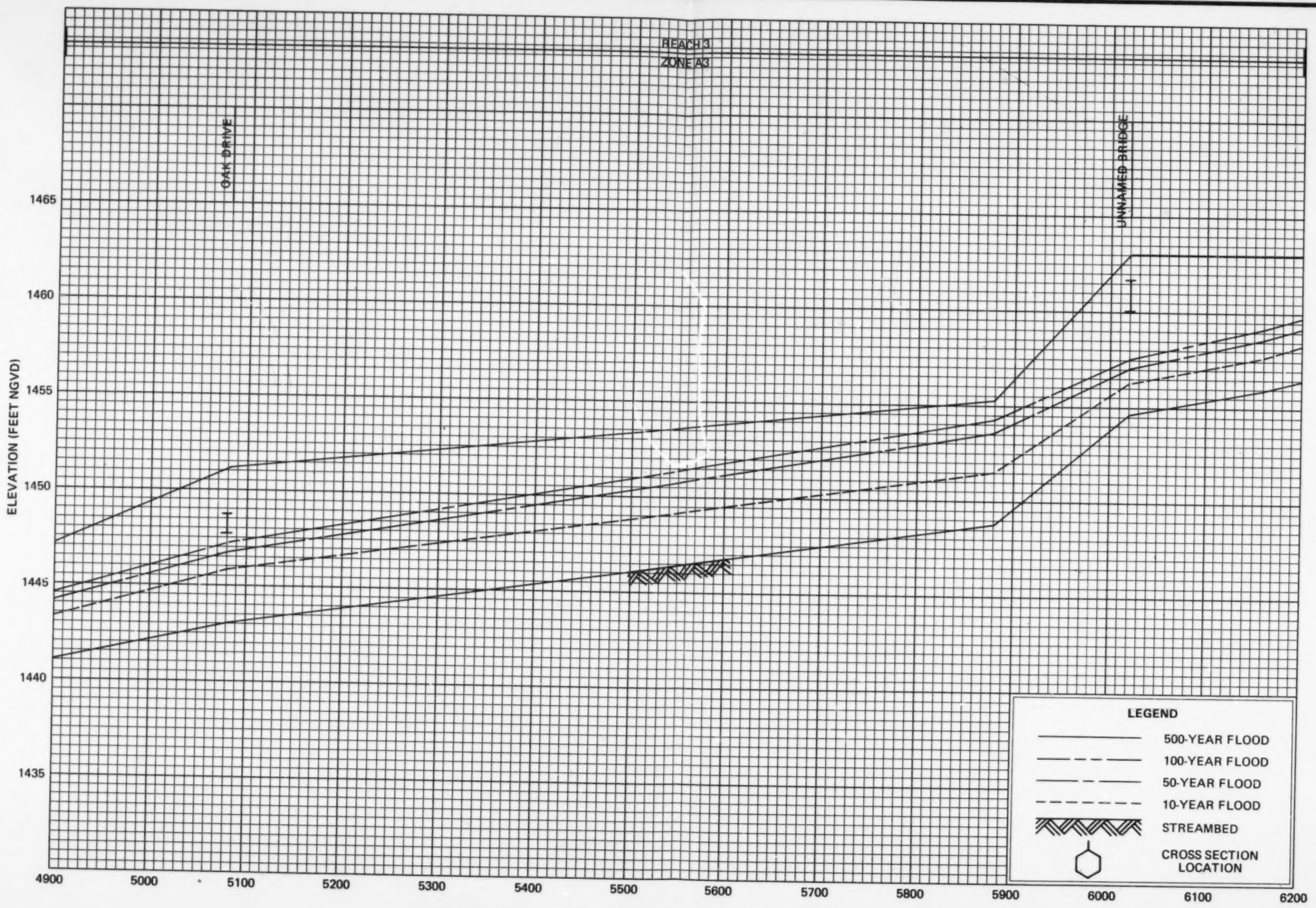


FLOOD PROFILES

LARSON CREEK

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CITY OF MEDFORD, OR
(JACKSON CO.)

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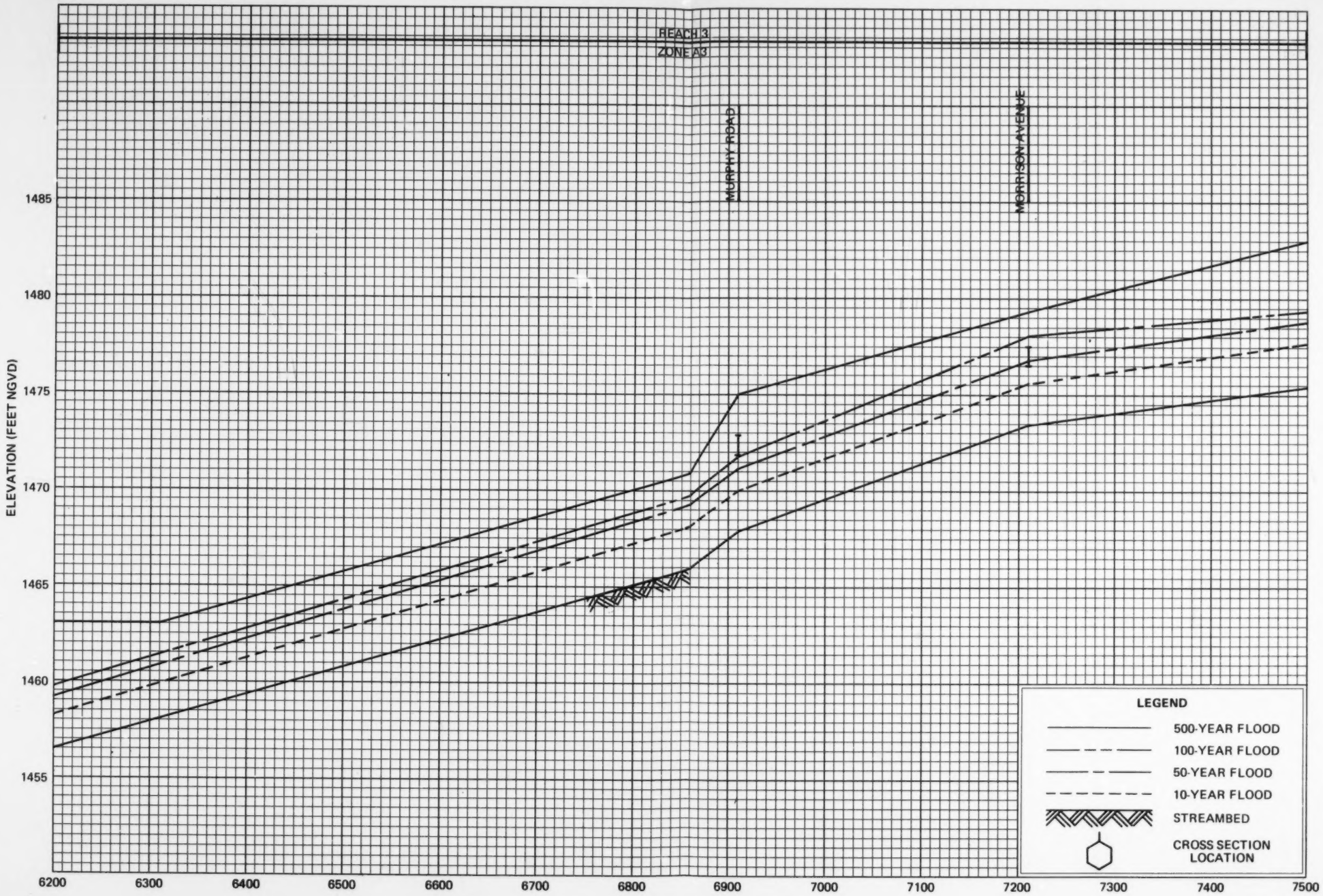


# FLOOD PROFILES

## LARSON CREEK

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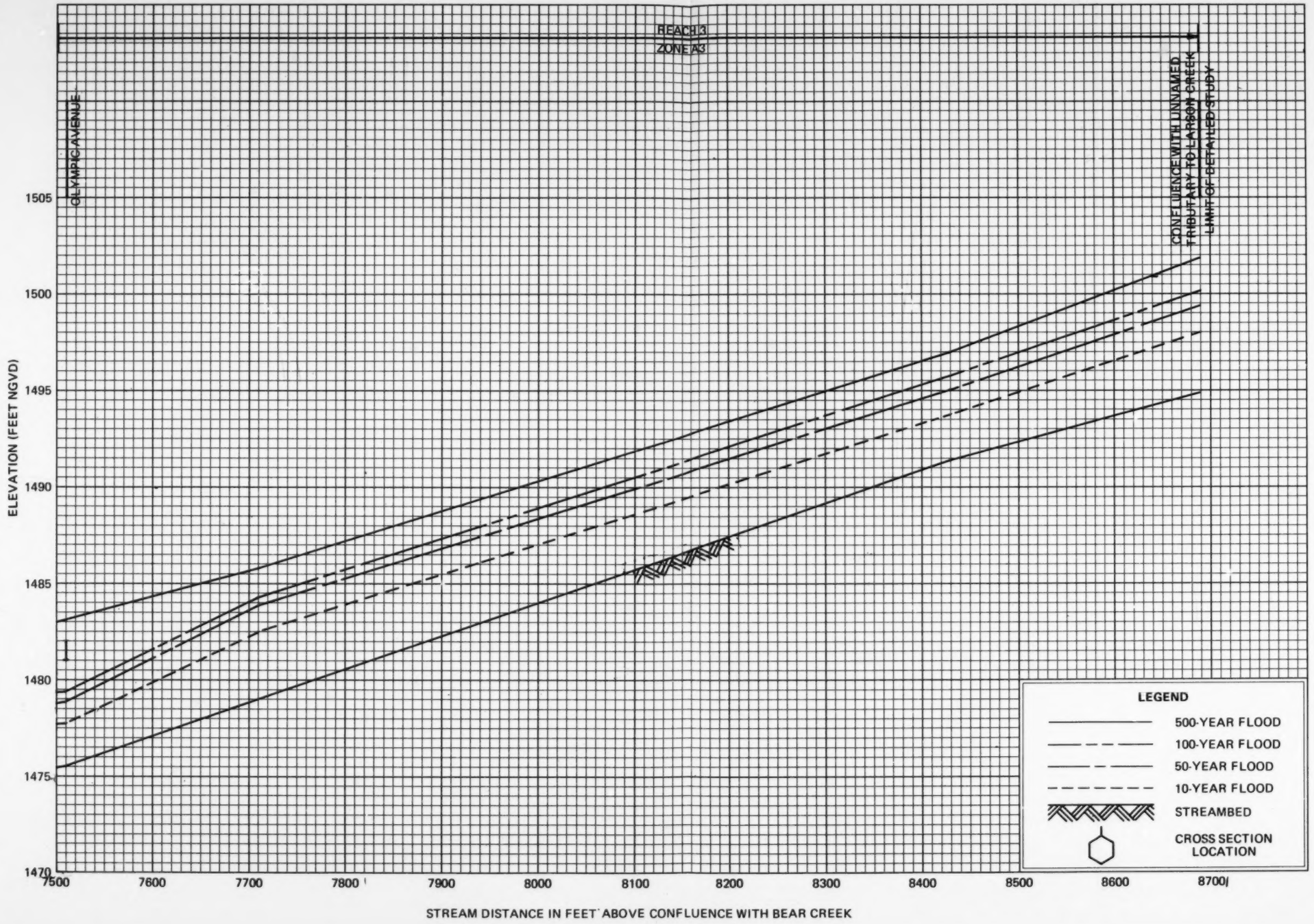


**FLOOD PROFILES**

**LARSON CREEK**

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**CITY OF MEDFORD, OR**
(JACKSON CO.)

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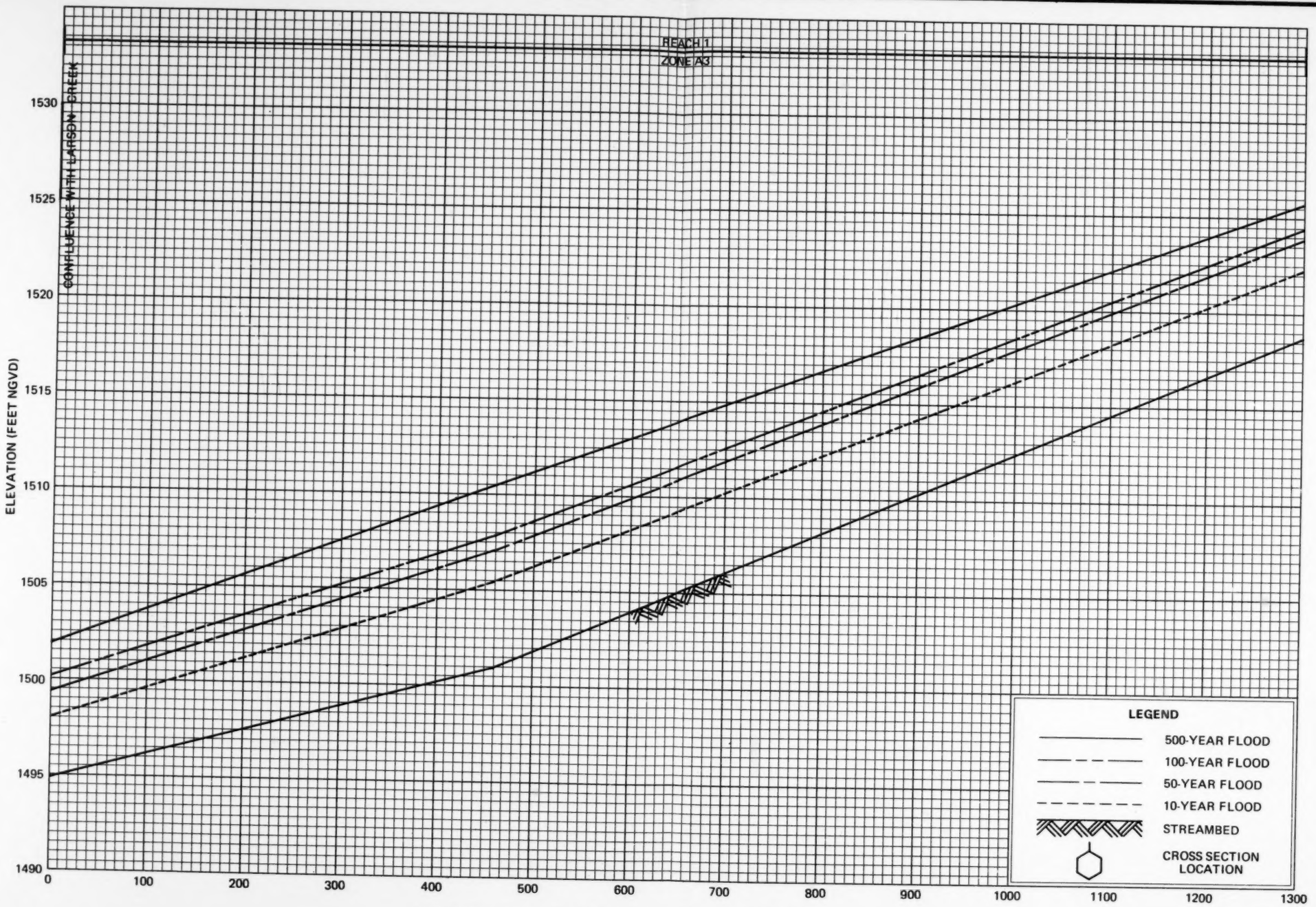


FLOOD PROFILES

UNNAMED TRIBUTARY TO LARSON CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

CITY OF MEDFORD, OR
(JACKSON CO.)

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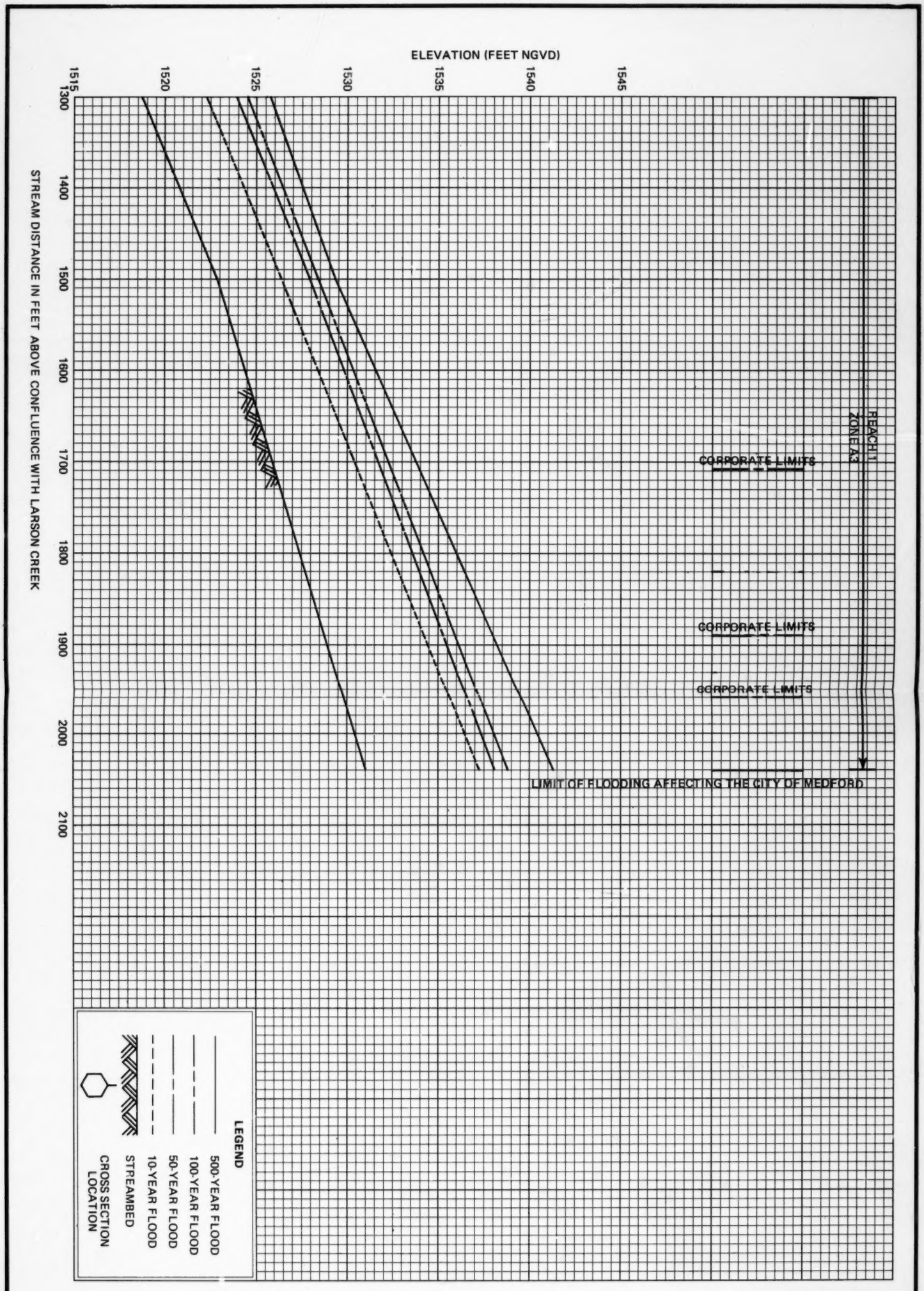


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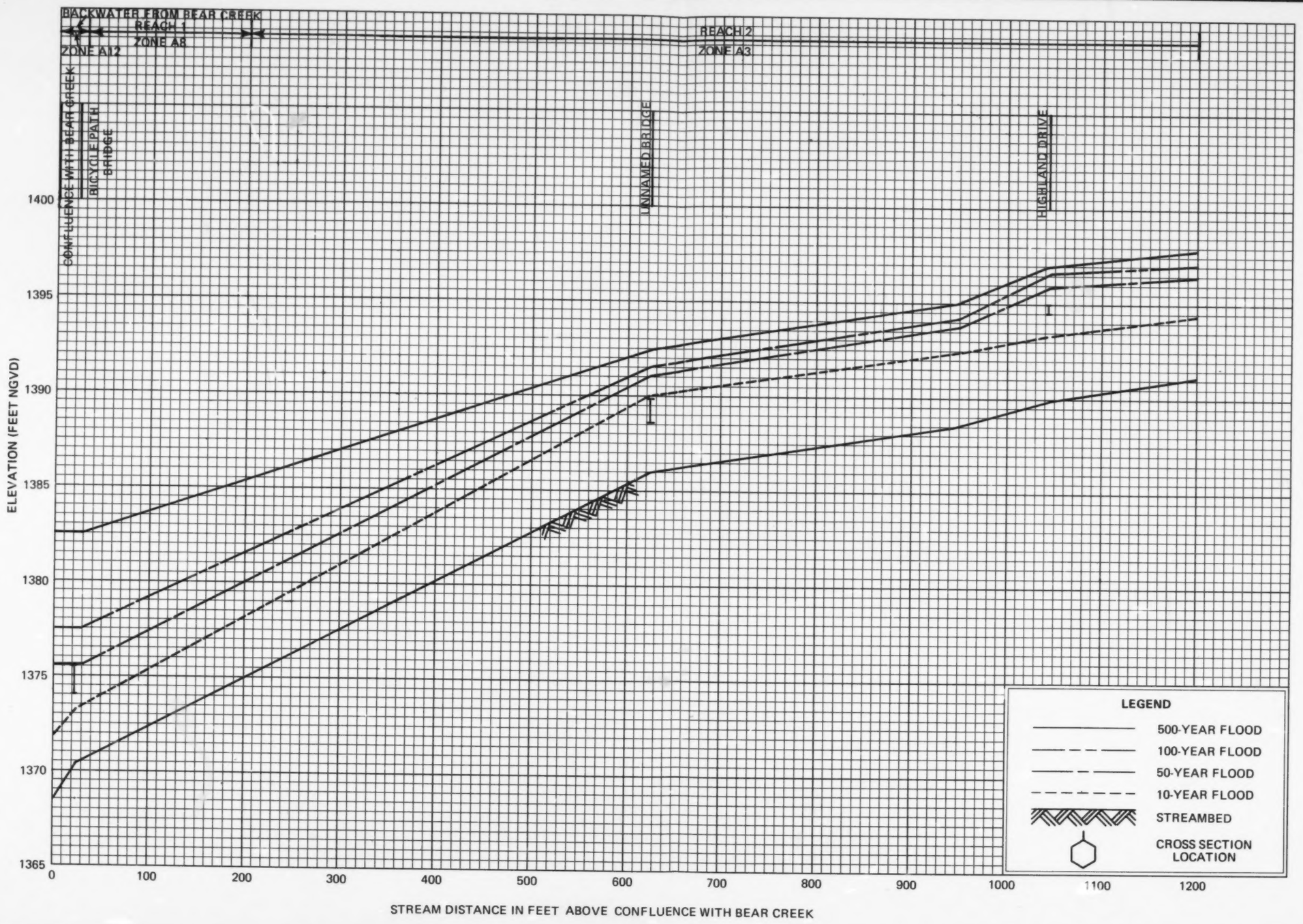
**CITY OF MEDFORD, OR**
(JACKSON CO.)

**FLOOD PROFILES**

**UNNAMED TRIBUTARY TO LARSON CREEK**




FLOOD PROFILES

LAZY CREEK

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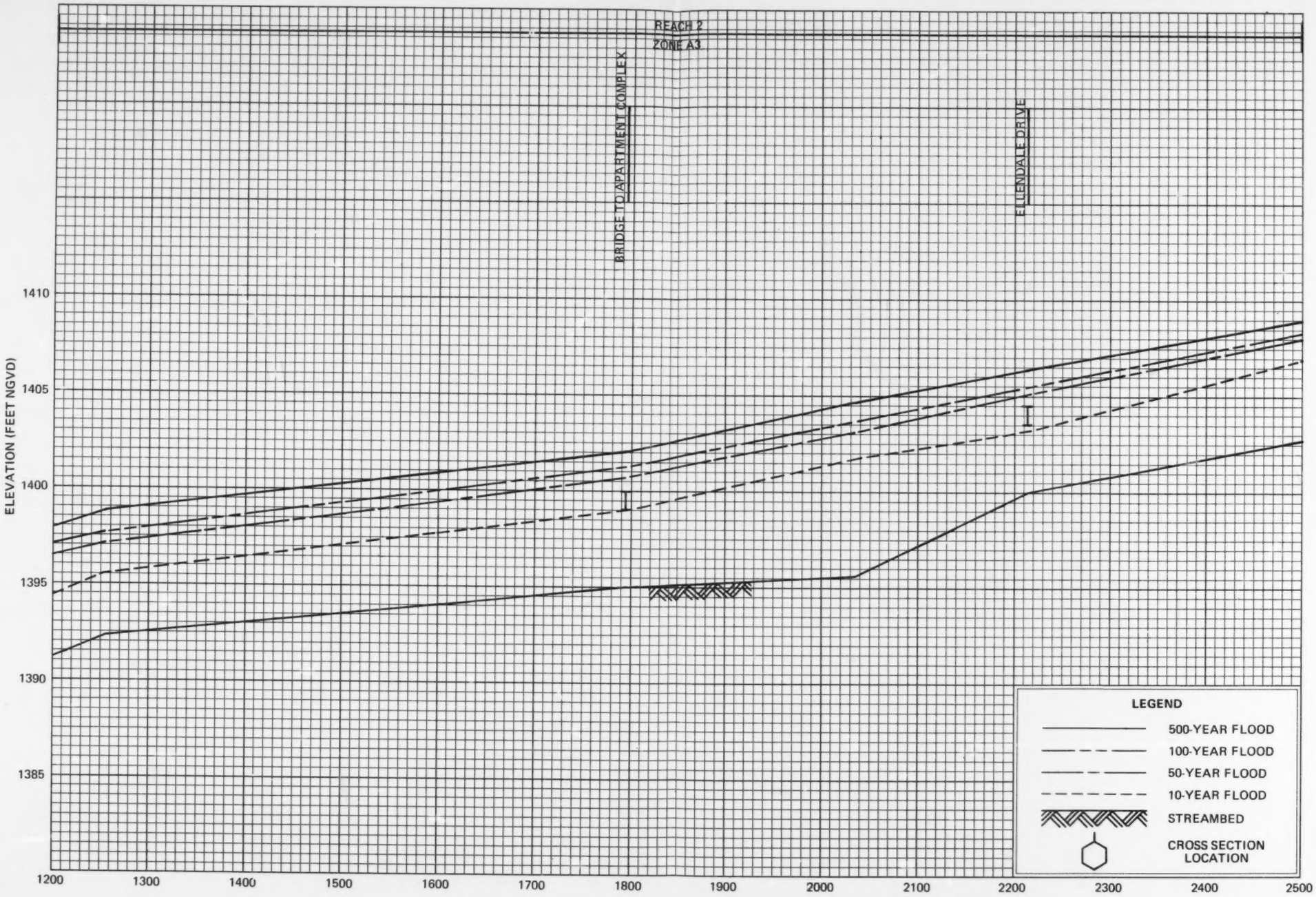


FLOOD PROFILES

LAZY CREEK

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CITY OF MEDFORD, OR
(JACKSON CO.)

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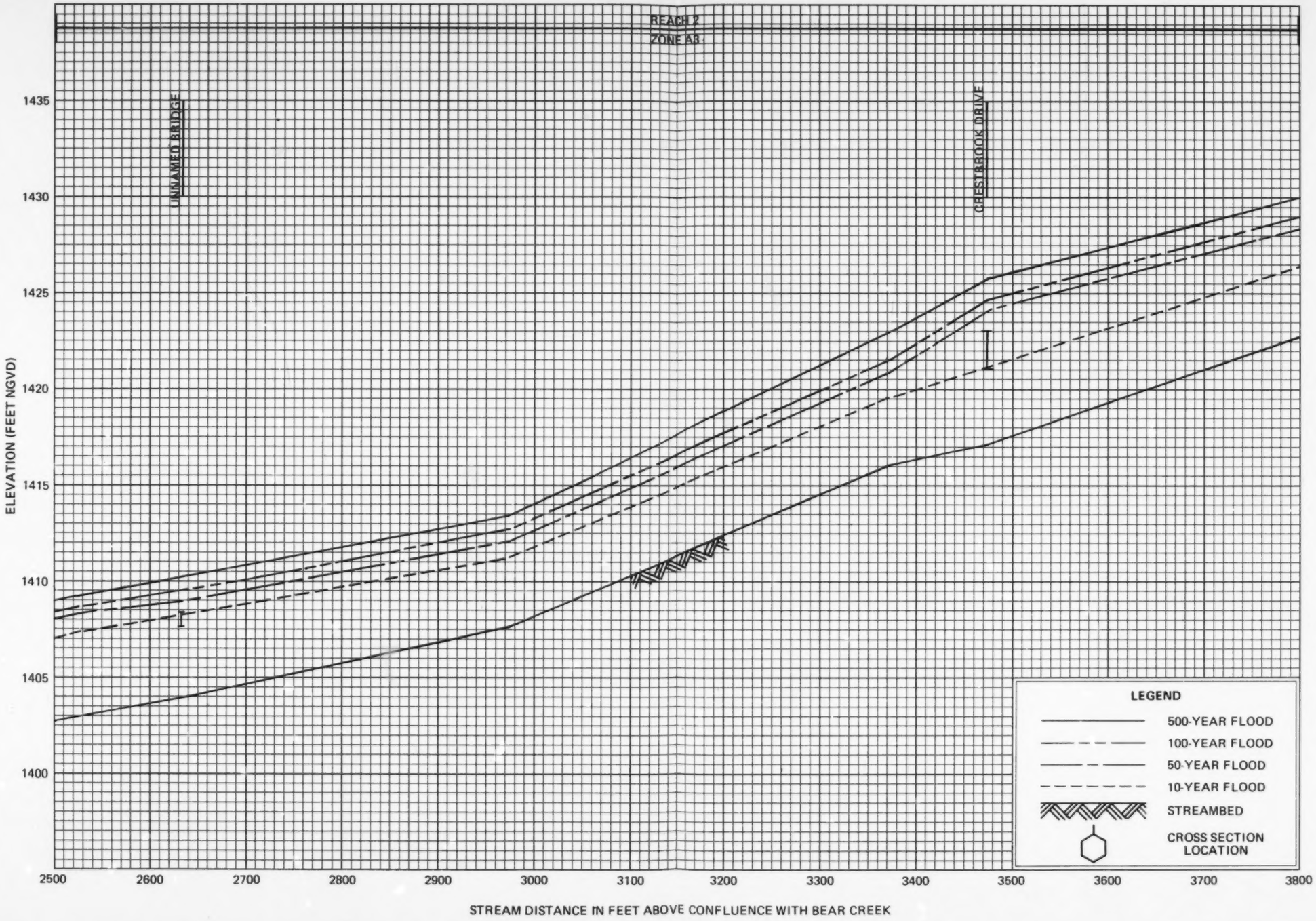


FLOOD PROFILES

LAZY CREEK

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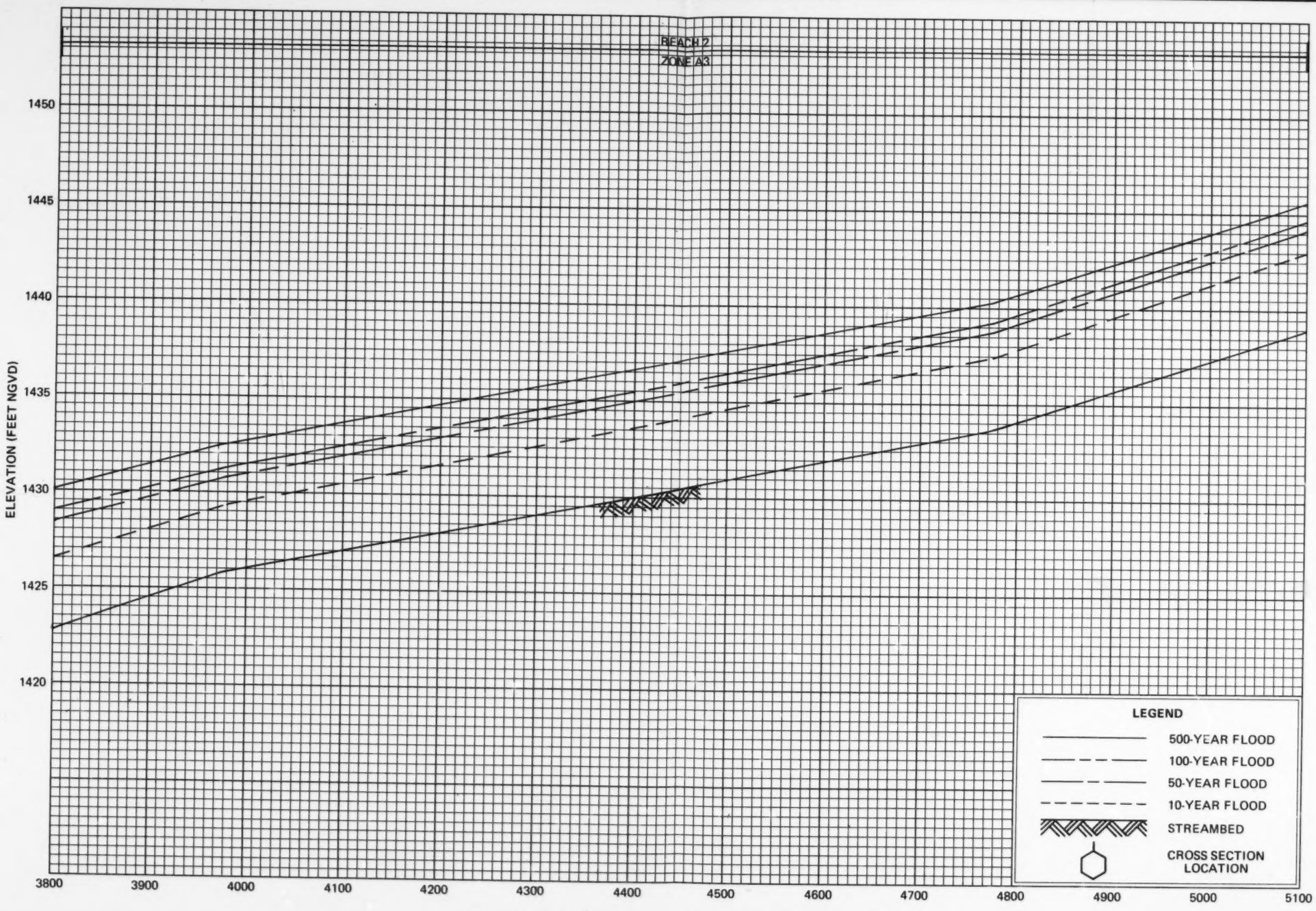


FLOOD PROFILES

LAZY CREEK

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Federal Insurance Administration

CITY OF MEDFORD, OR
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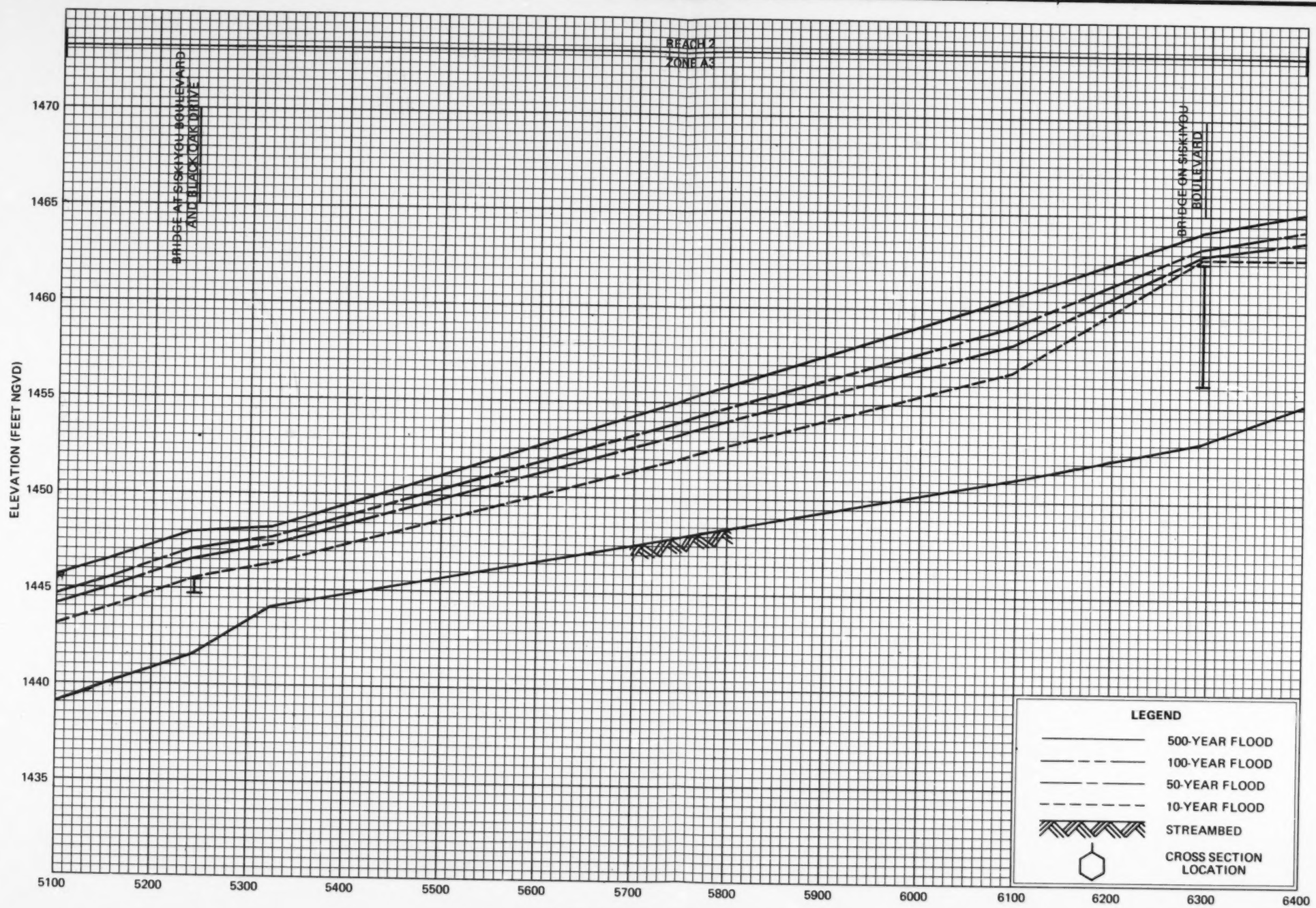


FLOOD PROFILES

LAZY CREEK

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CITY OF MEDFORD, OR
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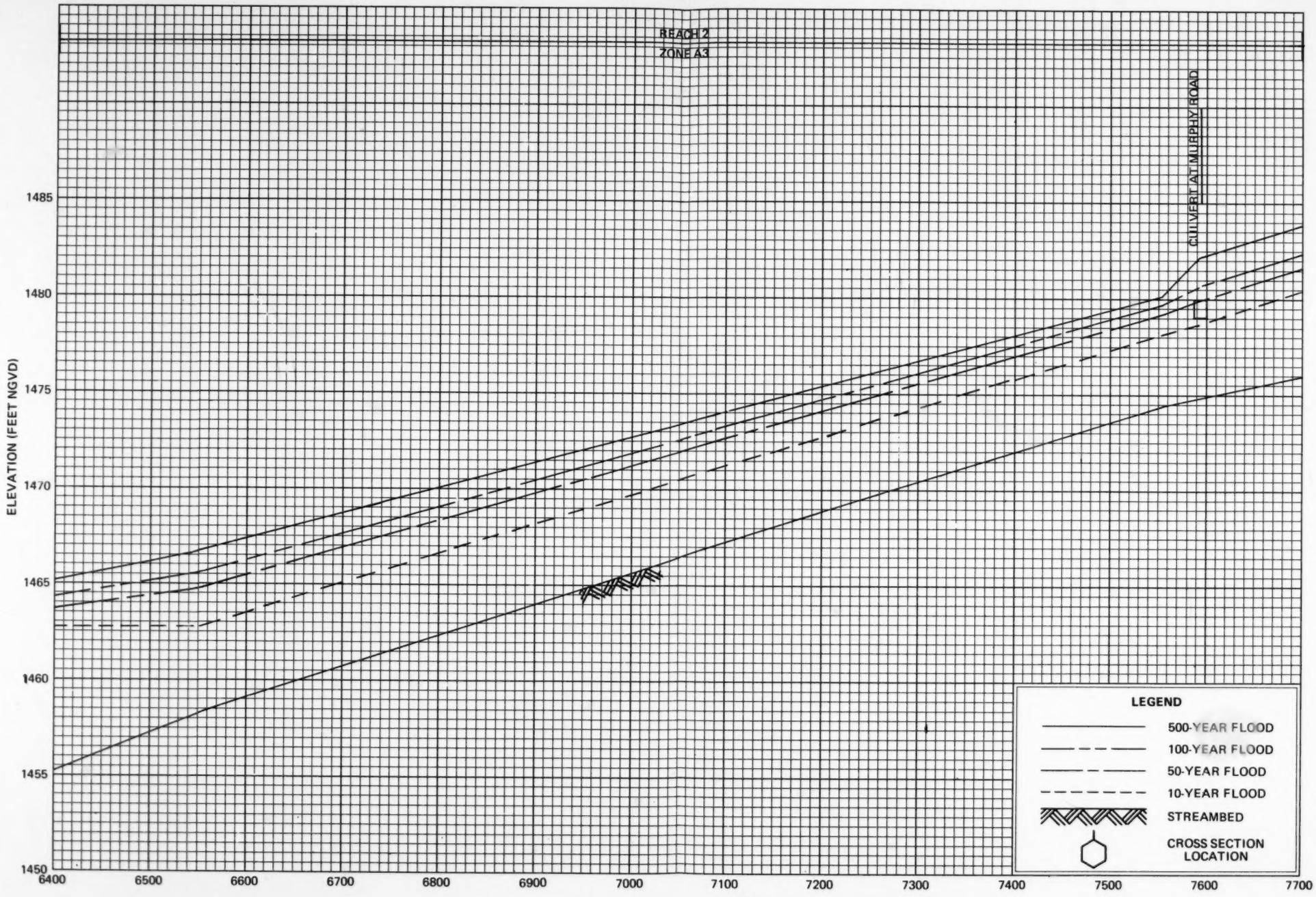


FLOOD PROFILES

LAZY CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

CITY OF MEDFORD, OR
(JACKSON CO.)

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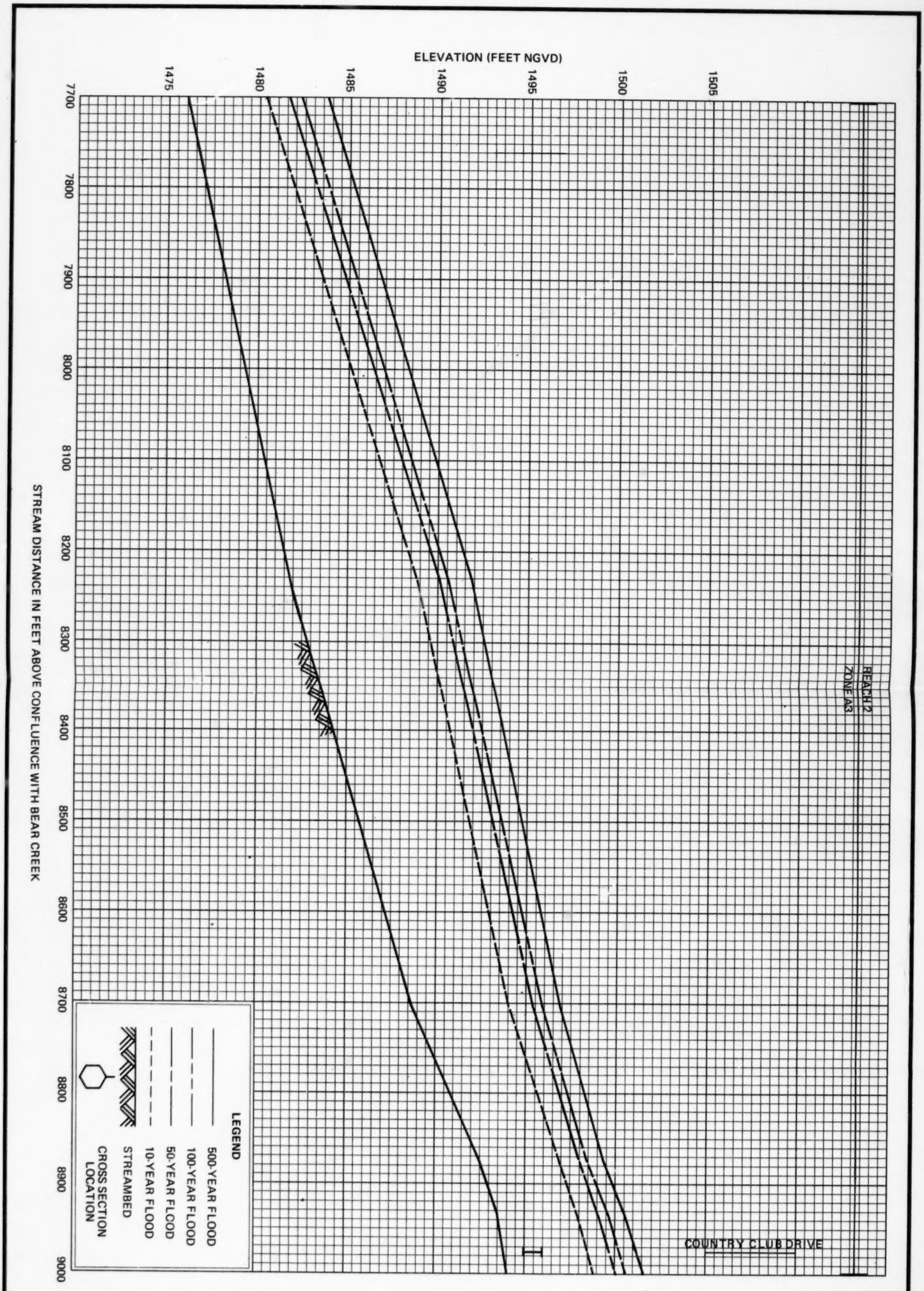


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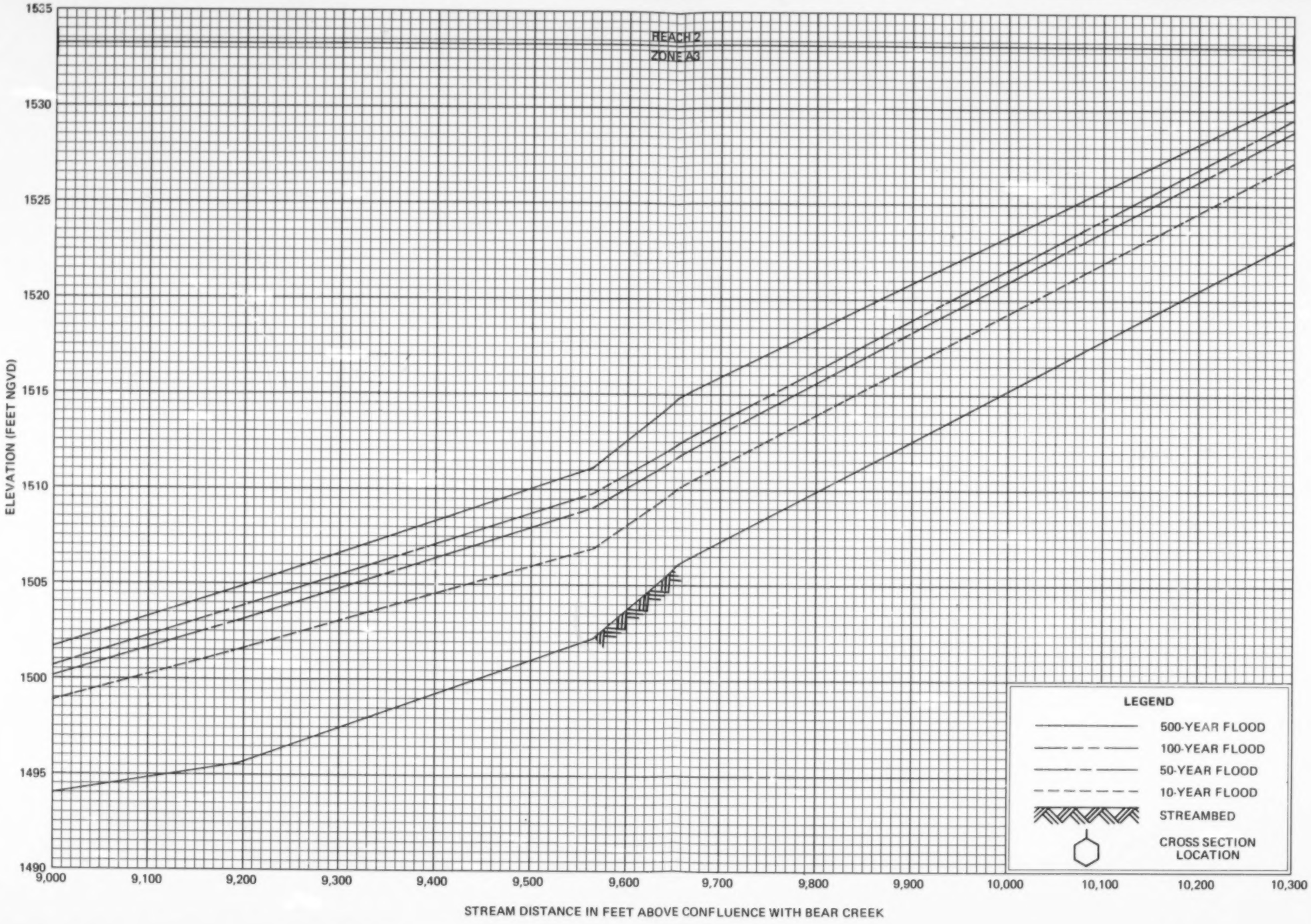
FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

**CITY OF MEDFORD, OR**
(JACKSON CO.)

**FLOOD PROFILES**

**LAZY CREEK**




FLOOD PROFILES

LAZY CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

CITY OF MEDFORD, OR
(JACKSON CO.)

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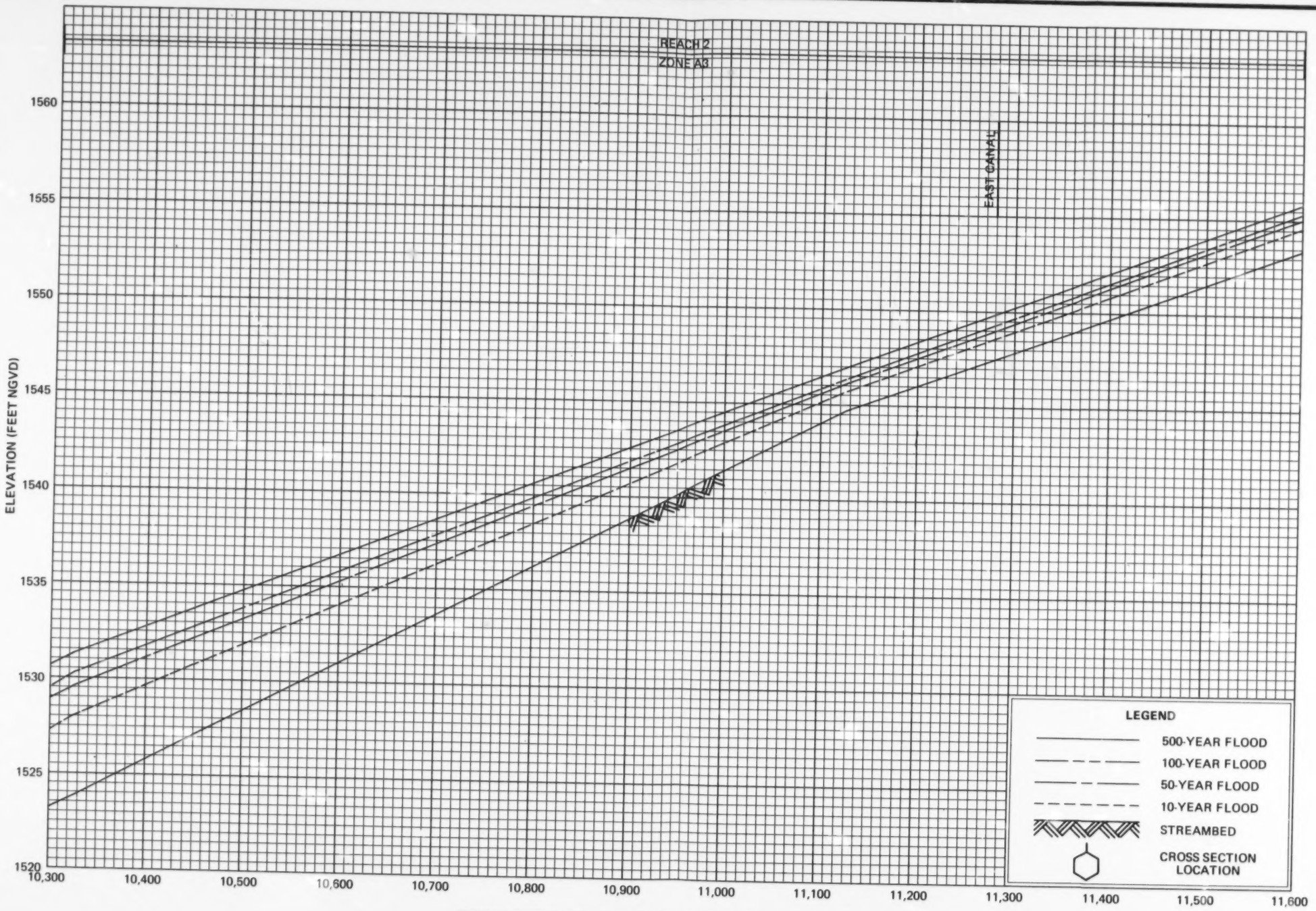


FLOOD PROFILES

LAZY CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

CITY OF MEDFORD, OR
(JACKSON CO.)

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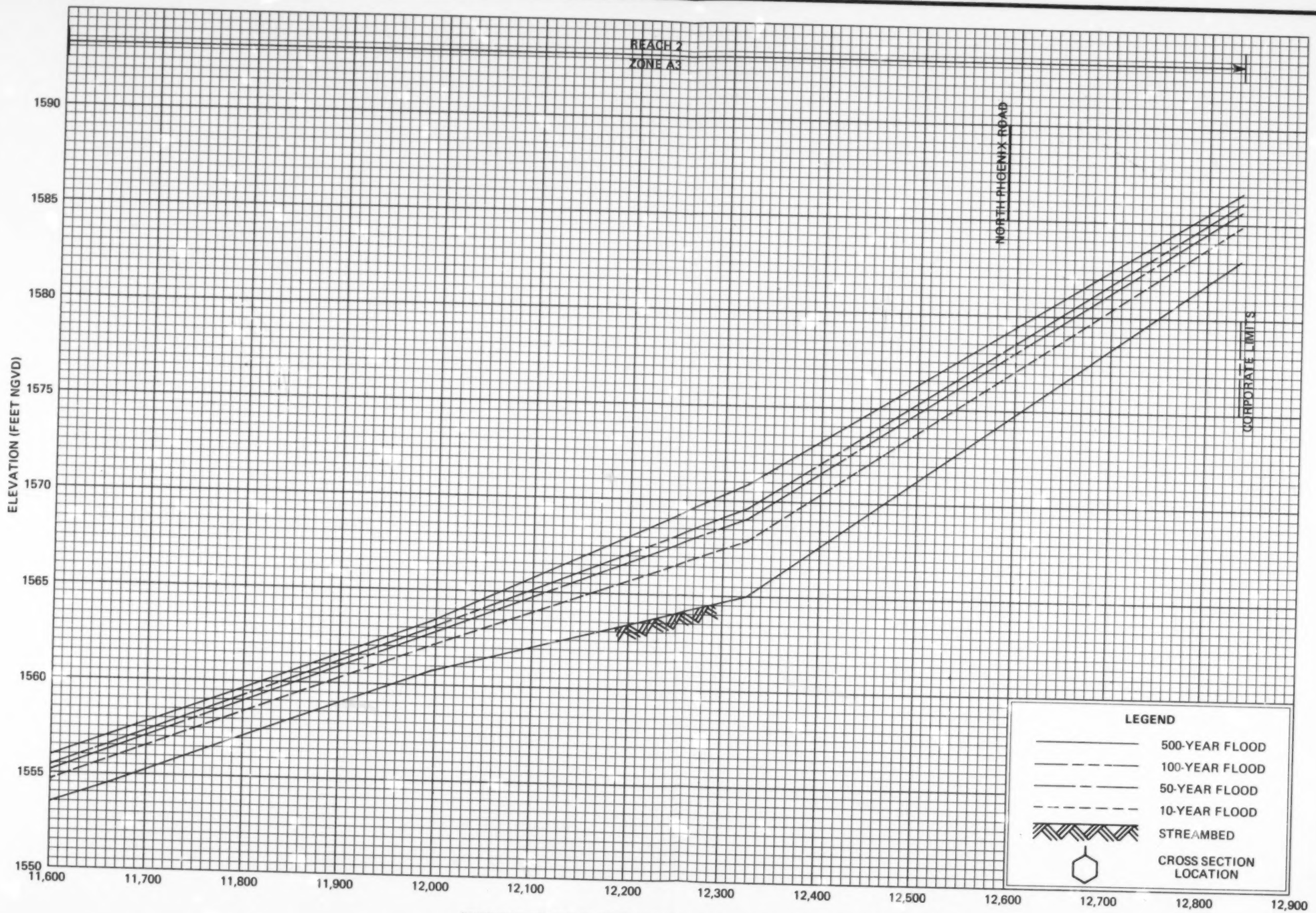


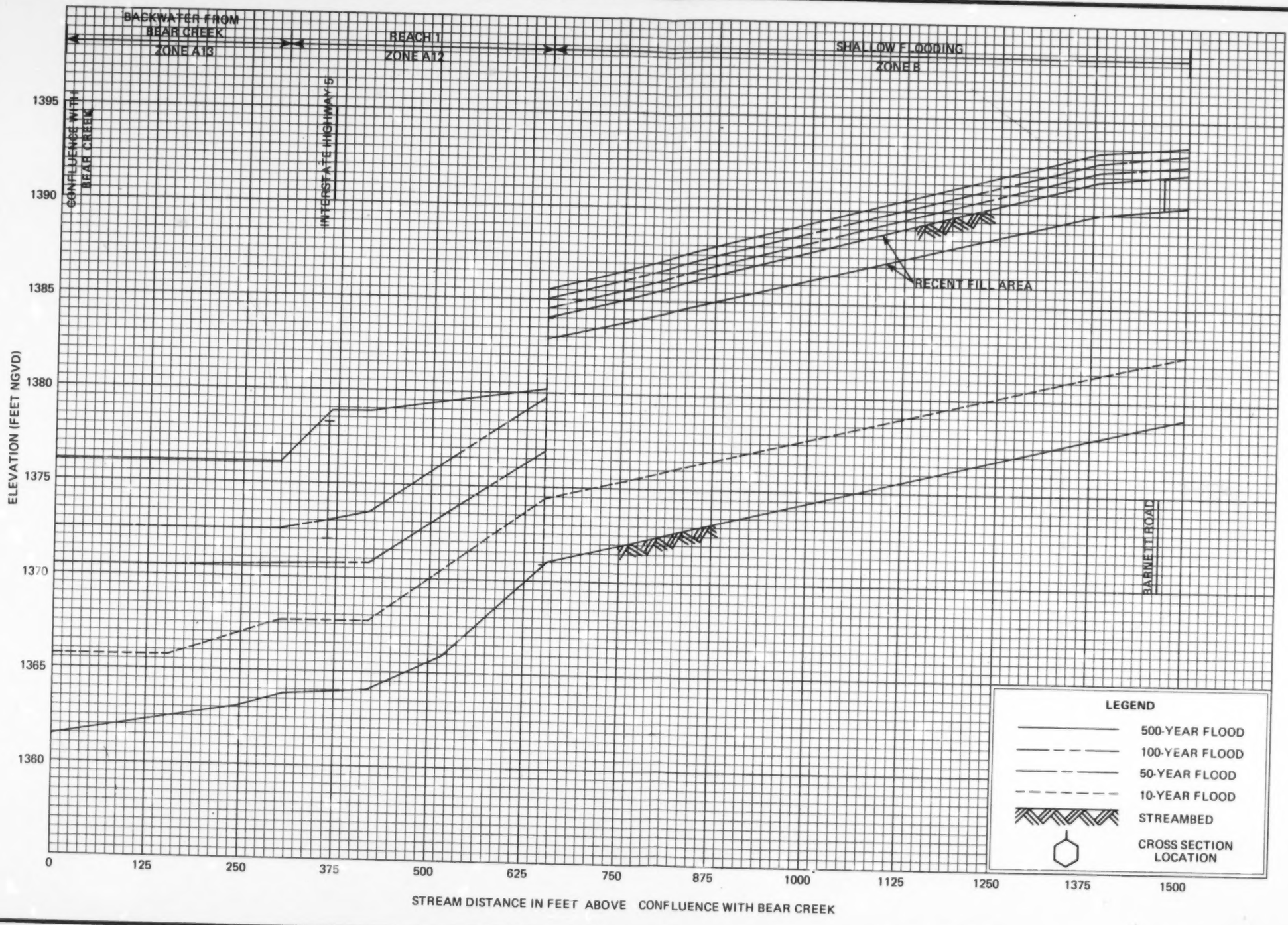

FLOOD PROFILES

LAZY CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

CITY OF MEDFORD, OR
(JACKSON CO.)

24P

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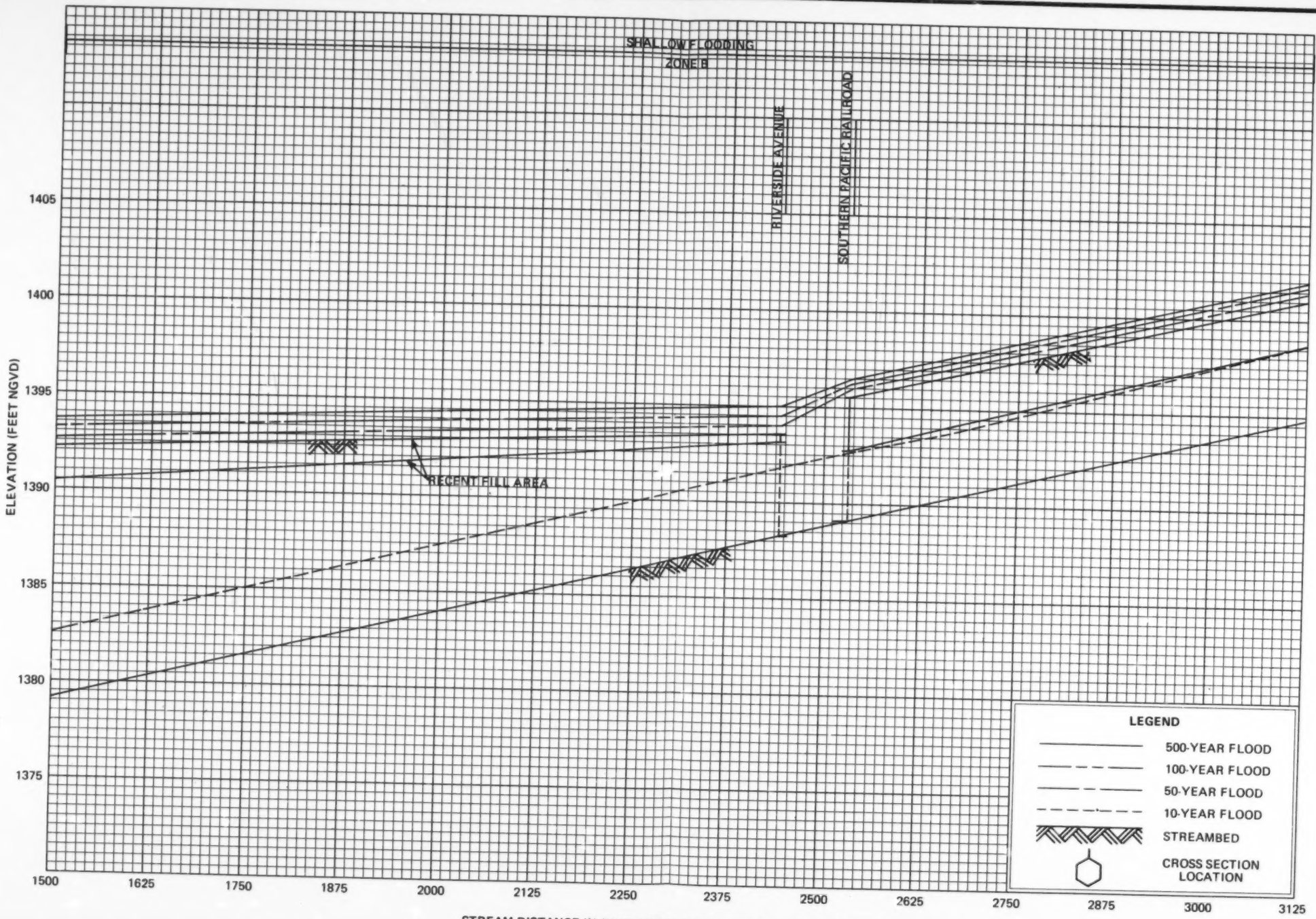
CITY OF MEDFORD, OR
(JACKSON CO.)

25P

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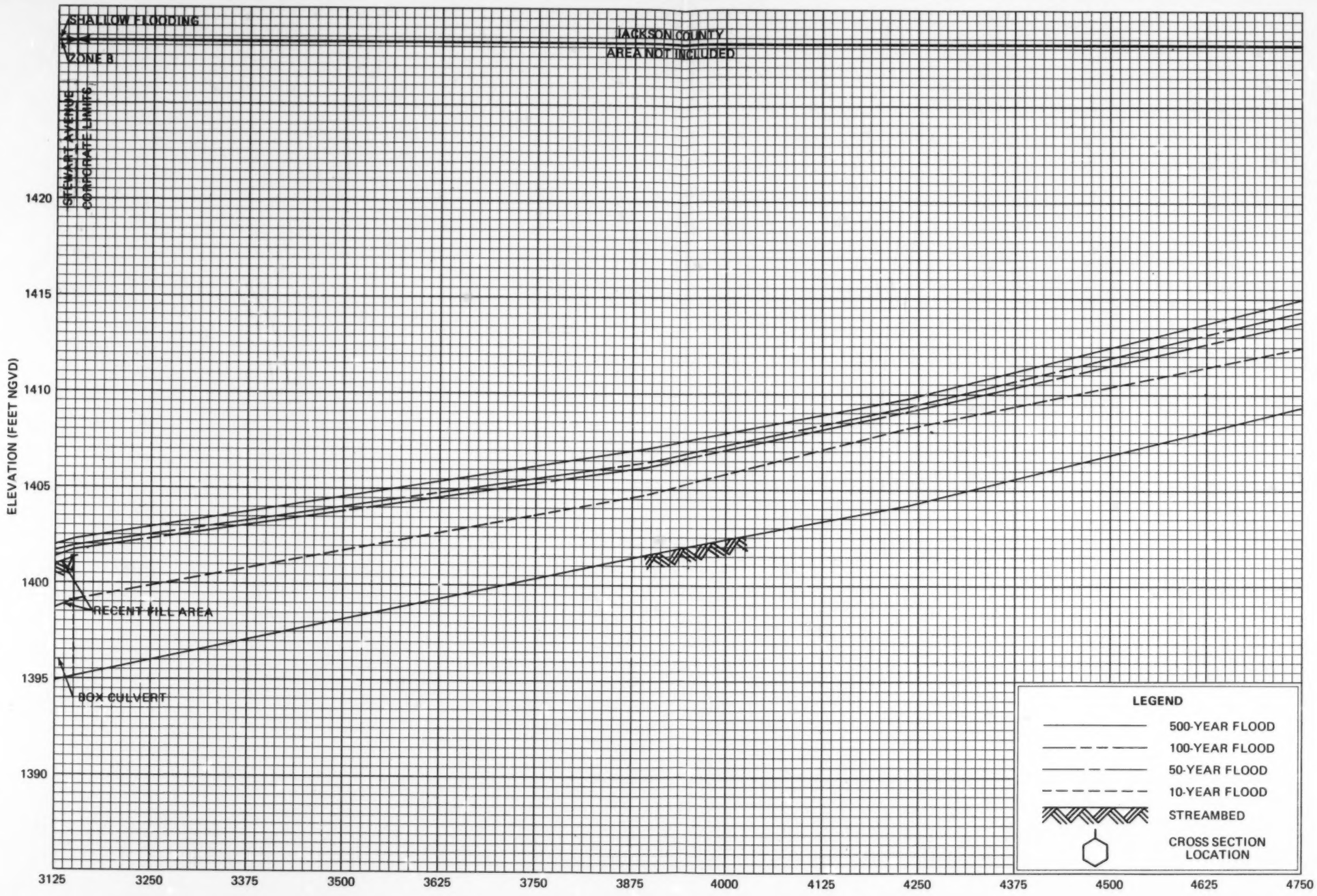
26P

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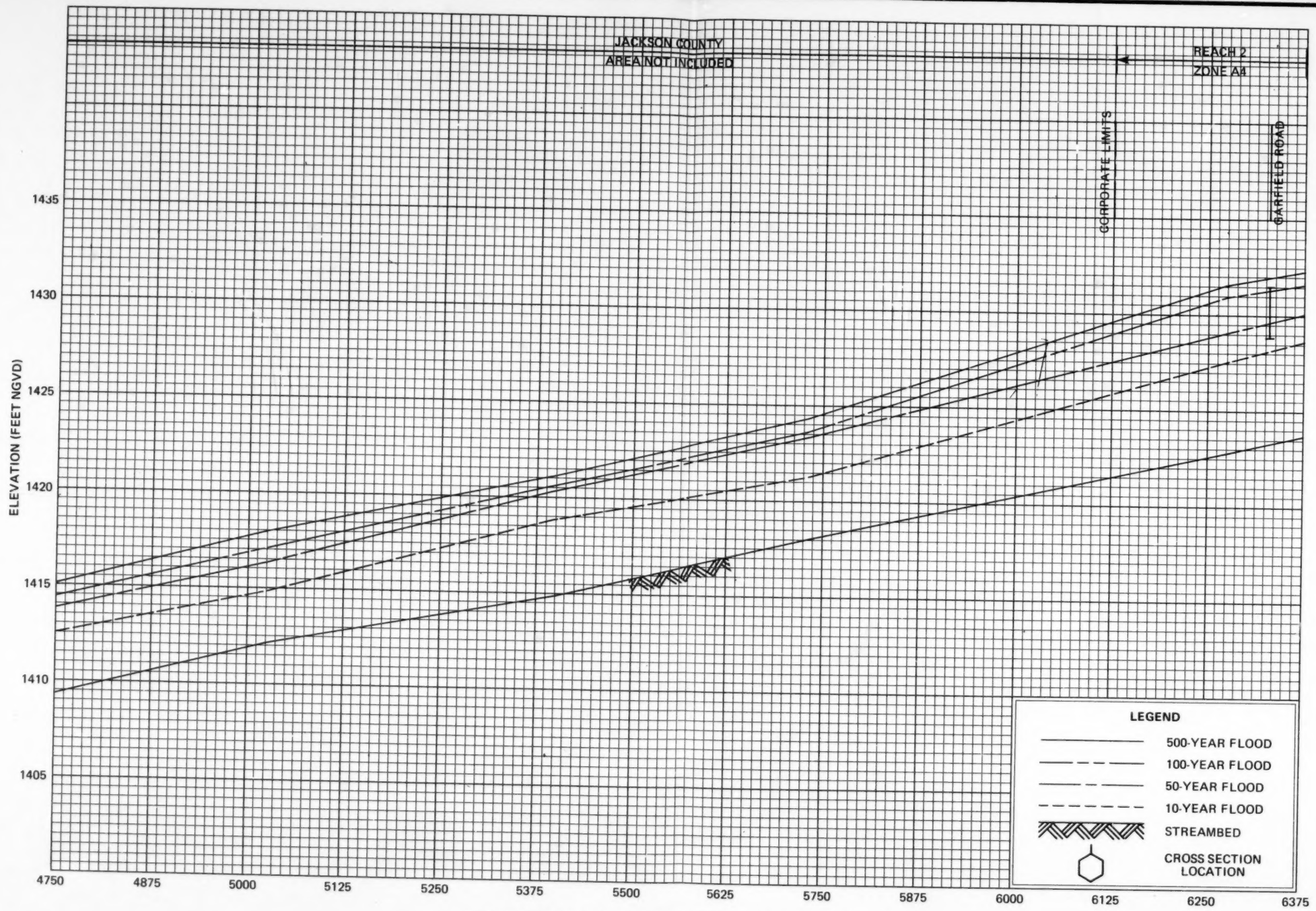
27P

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28P

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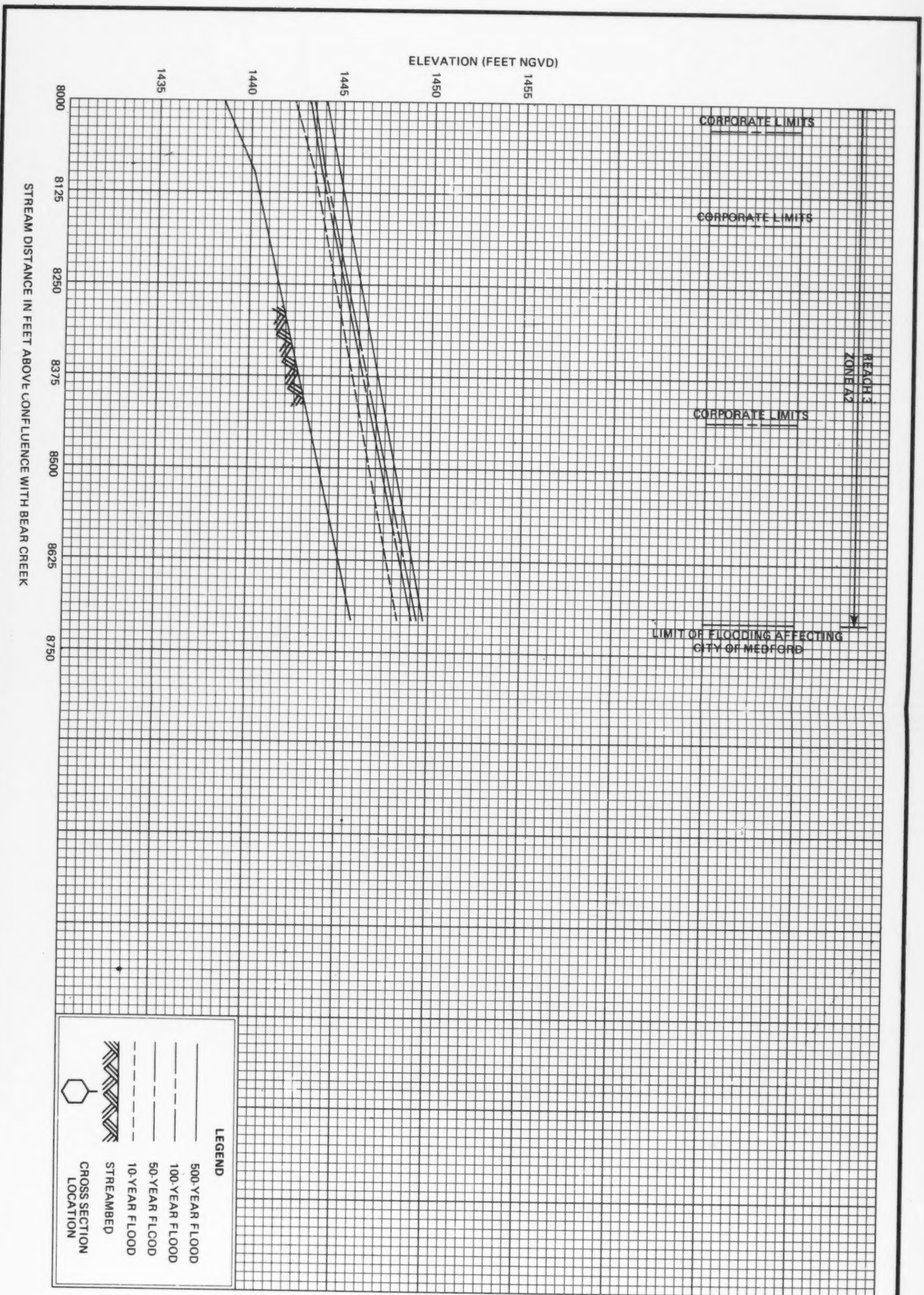
29P




30P

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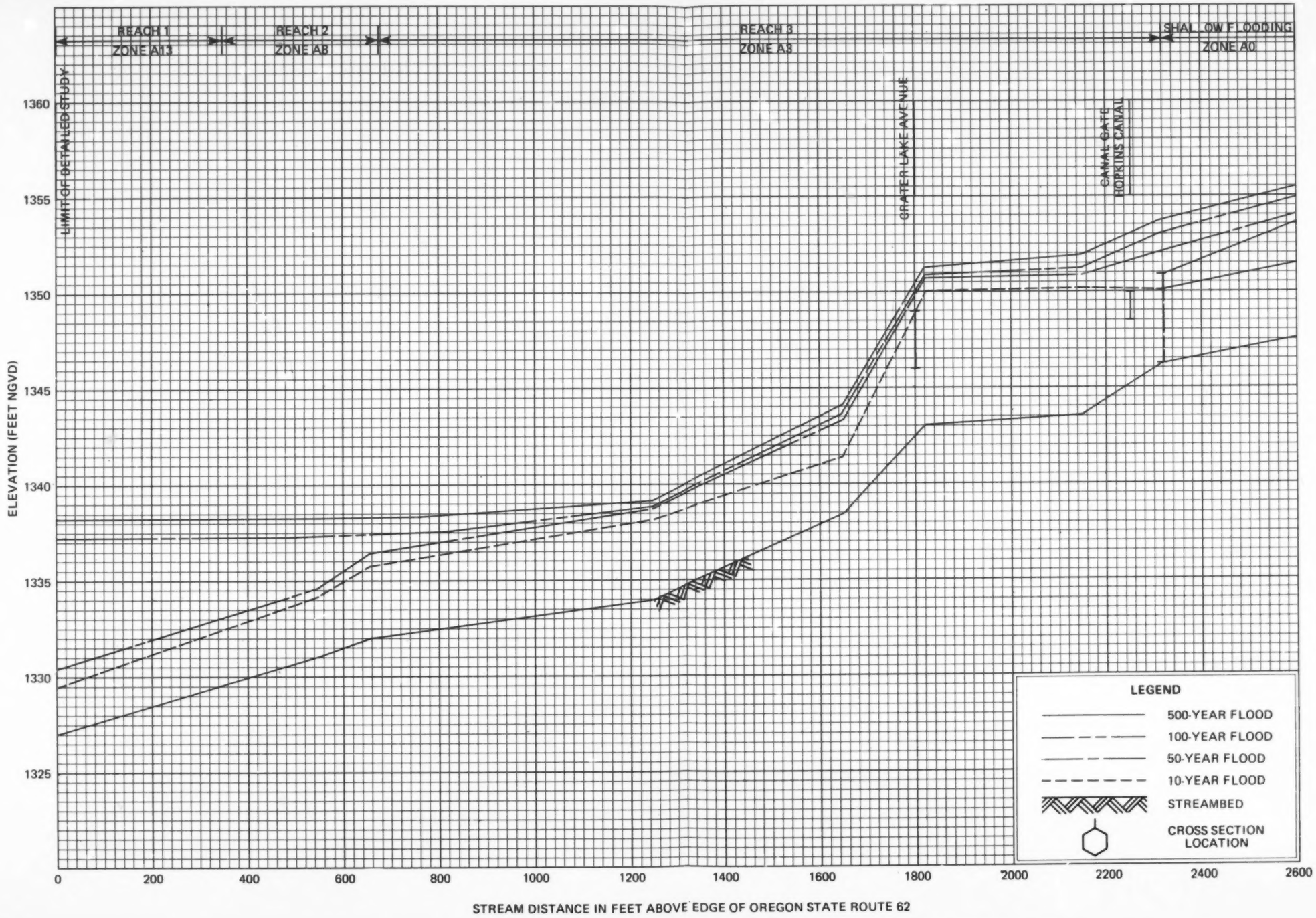
**CROOKED CREEK**

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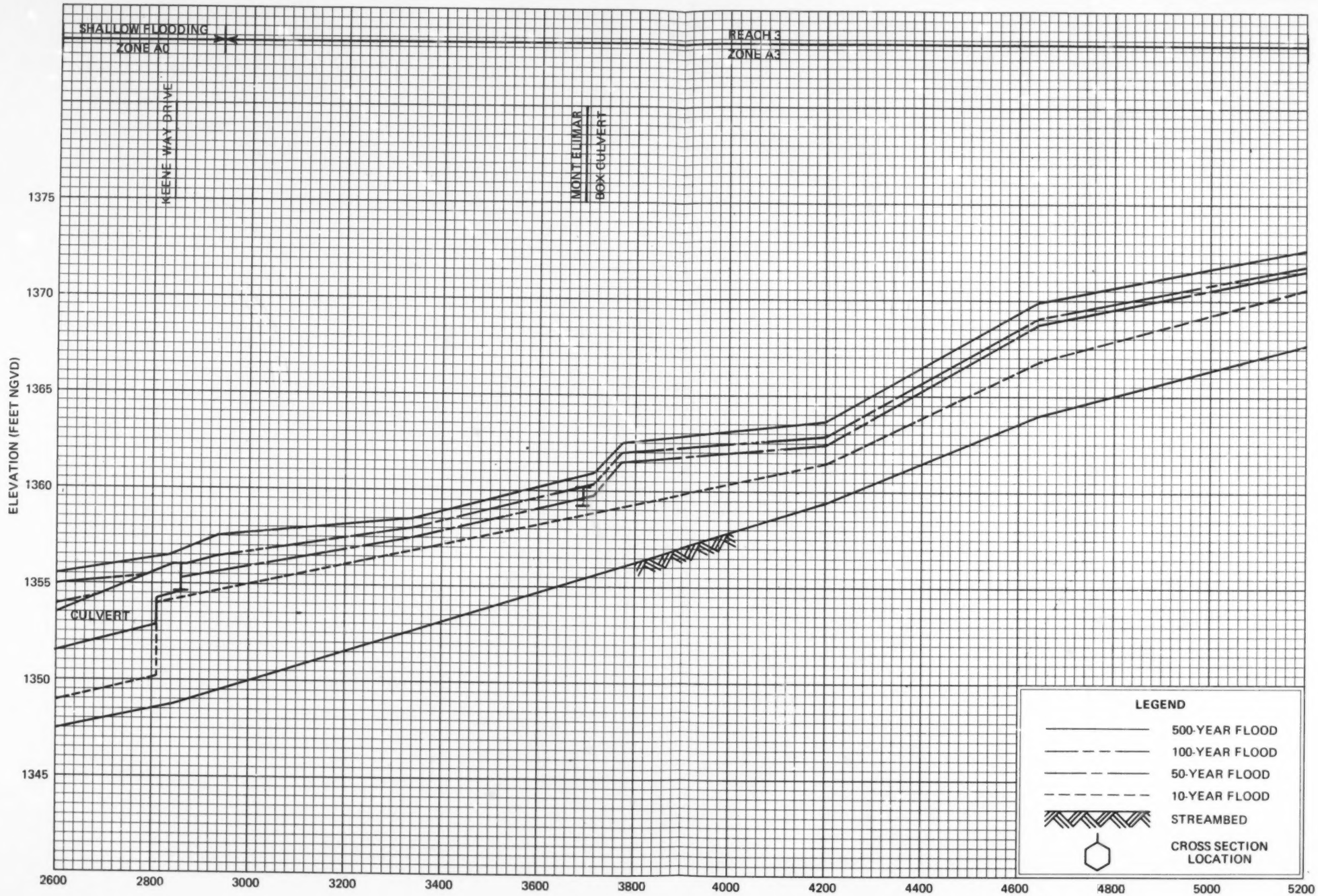
31P

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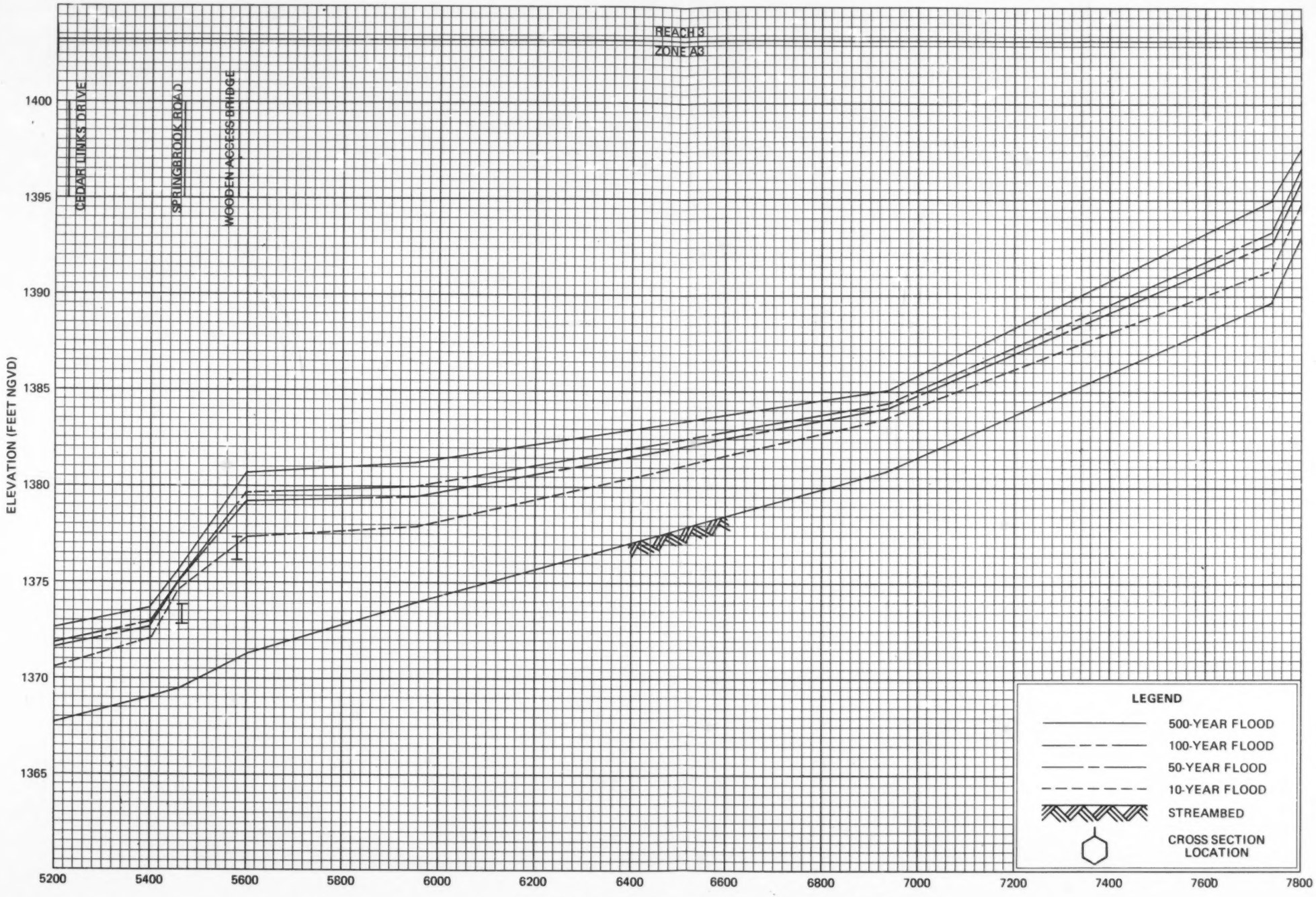
32P

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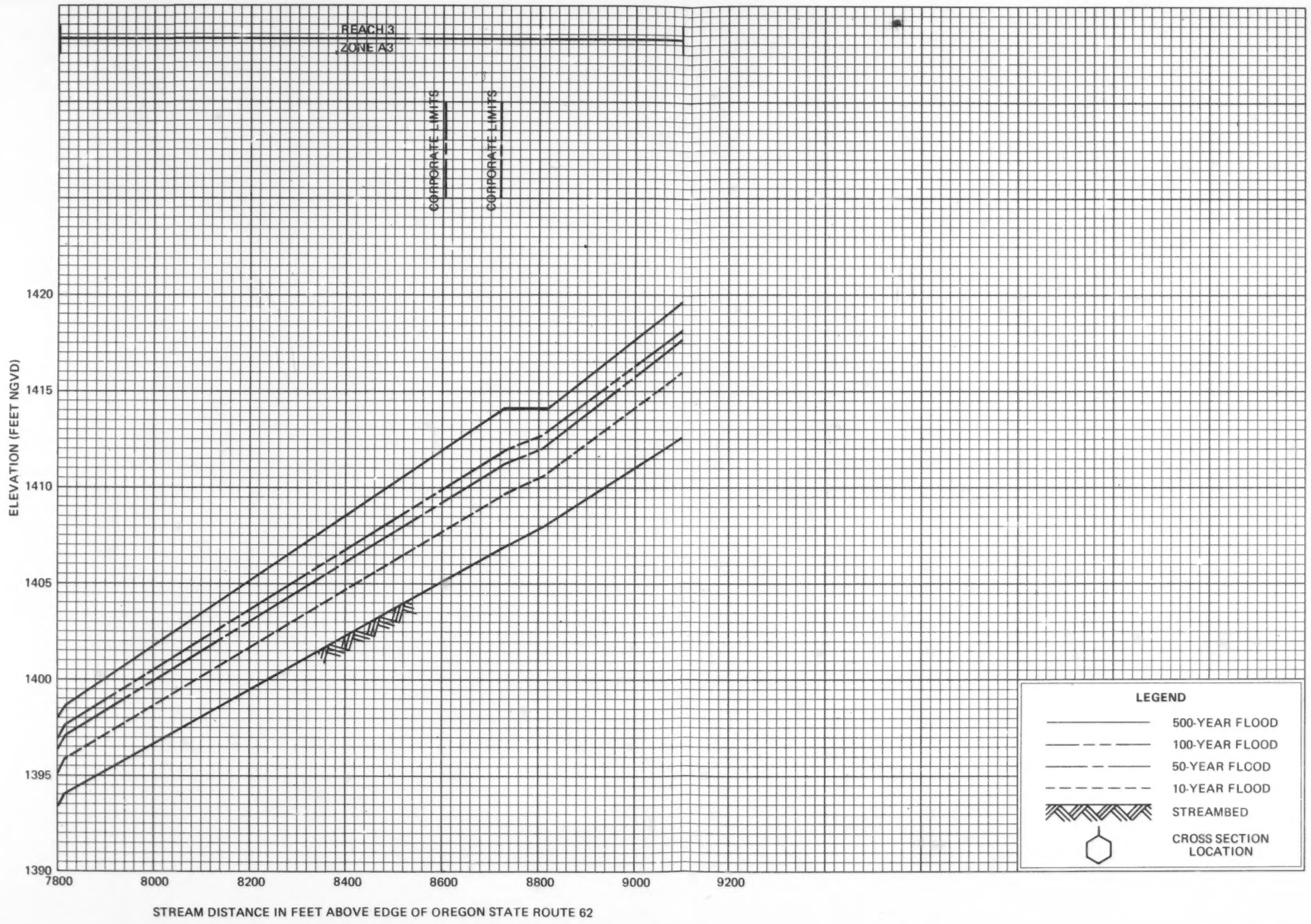
33P

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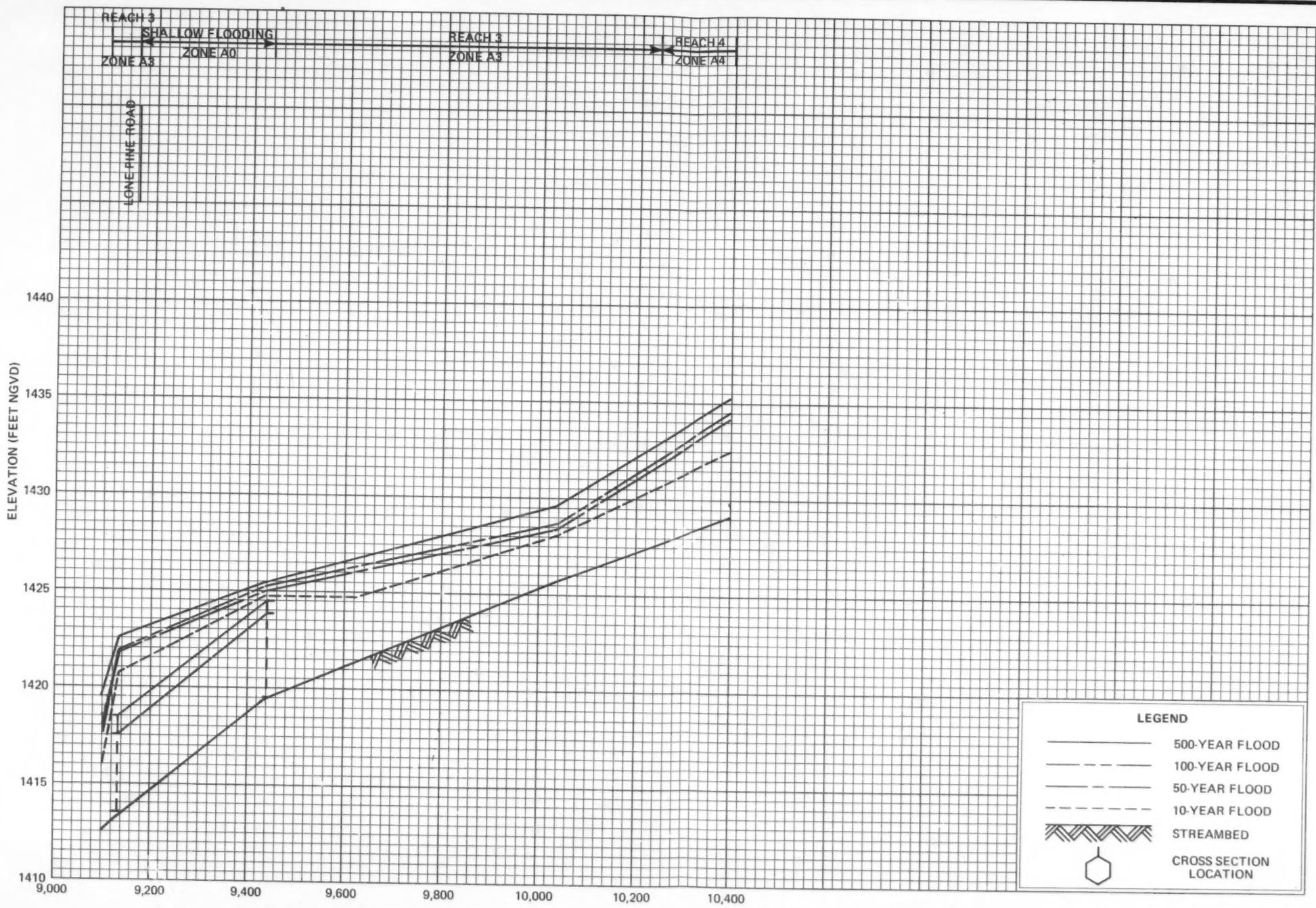


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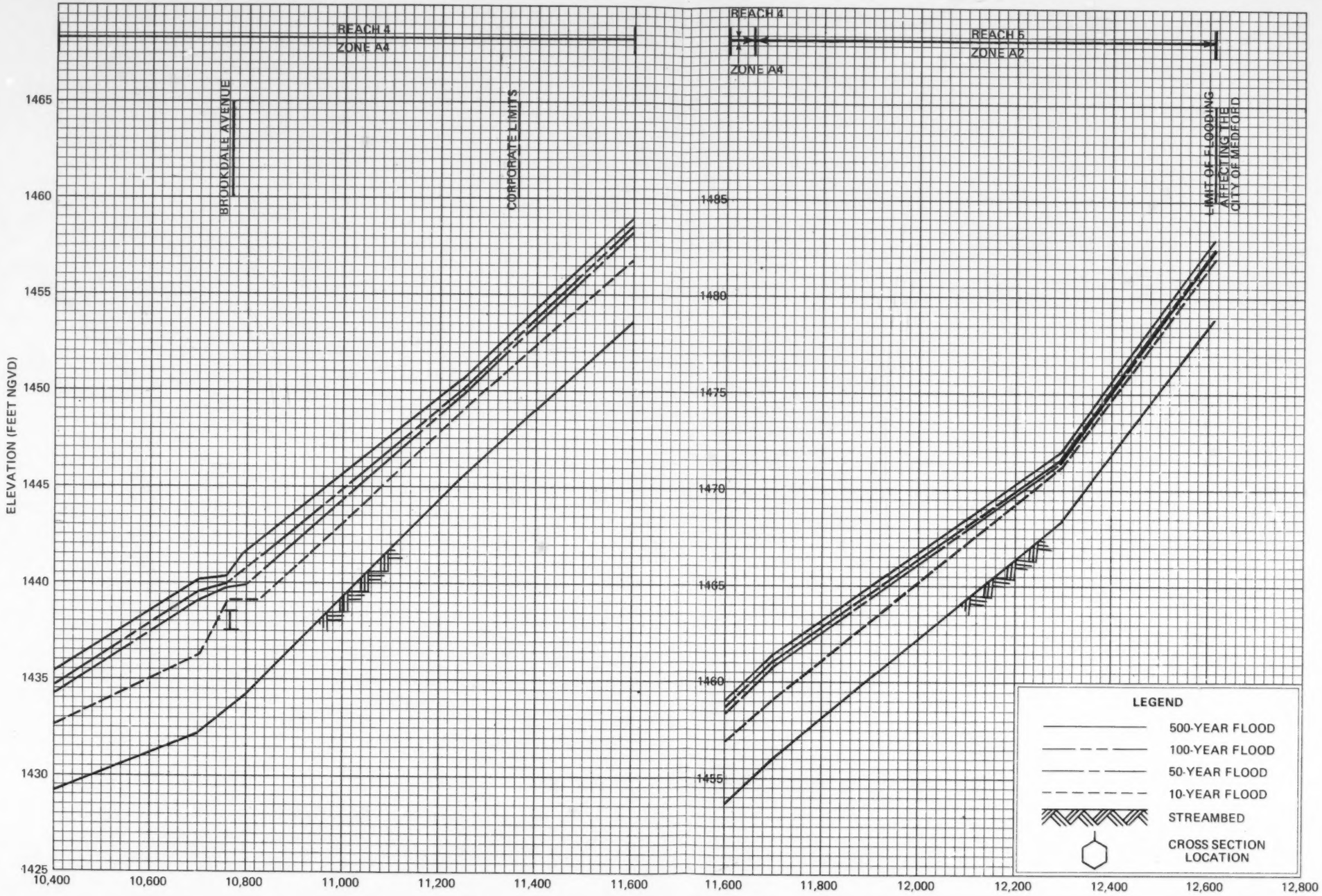
35P

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36P